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Improvement in Sheet Mill Practice

New Italian Design Intended to Reduce Labor
Costs and Increase Production—Semi-
Automatic Features

BY ERNESTO D'AMICO*

LITTLE progress has been made along the line of rendering sheet-rolling mills automatic, while all other kinds of mills have been perfected to such an extent as to permit reaching high figures of production never even dreamed of in the past, with a reduced employment of labor. We are led to believe that the reason for this slow progress is based on the small number of thin sheet rolling mills and on the conservative spirit of both management and labor, as there is nothing to prevent the adoption in existing sheet mills of all these improvements which, without altering the present installations, would bring, as a result, not only a larger production but also a great saving of overhead and labor expenses, and consequently a lower cost of manufacture.

Ordinarily the procedure for rolling sheets may be summarized as follows:

Sheet bars, roughed out sheets and sheet packs are all heated in a furnace fed by coal or gas. This furnace is generally composed of two independent chambers. The sheet bars are heated in the first chamber; then they are put through the roughing rolls to be converted into roughed-out sheets. These latter are then returned to the furnace and placed in

the second chamber, to be reheated in preparation for the next rolling operation.

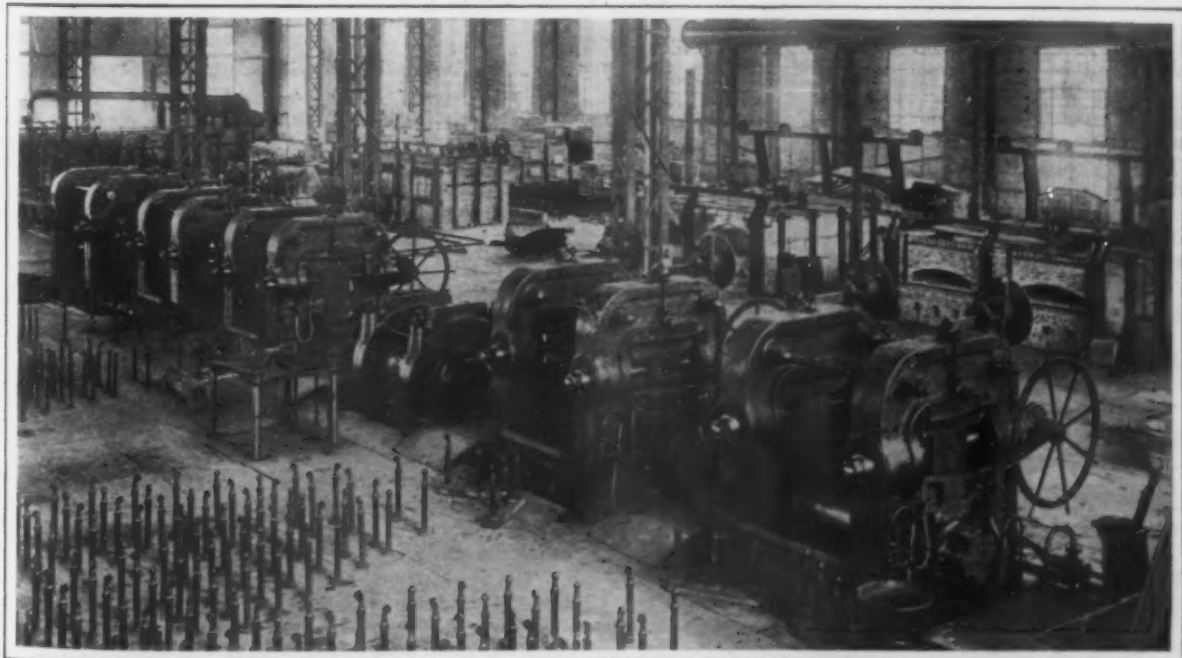
As soon as the roughed-out sheets have been properly reheated, they are once more put through the rolls, and then folded by means of the doubling machine. After this operation the sheets are brought again to the second chamber of the furnace and reheated for the third time. Finally they are taken out from the furnace to be rolled into finished sheets.

Thus the finishing stand is kept busy by rolling alternately roughed-out sheets and doubled sheets. In the meantime, however, the roughing stand is not working steadily, but is subjected to periods of idleness, which are extended to give time for the next charge of sheet bars to become heated. Operations as above are schematically shown in diagram, Fig. 1.

Now it is evident that the above procedure limits production and increases costs, due mainly to waste of heat, because of the noncontinuous utilization of the furnace and to waste of power, as the roughing stand is not working steadily. Also, the waste of labor is noteworthy, especially around the furnace, because this latter, not being continuous, requires quite a number of men for the handling of the material.

Before the war was over, the Società Anonima Alti

*Milan, Italy.



Detail of the Mill Stands, Showing the Wedge and Gear Action for Adjusting the Rolls. The automatic doubler appears, opposite the pinion housing, at left center

Forni, Fonferie & Acciaierie di Terni, in Rome, in order to complete its range of rolled products, and in prevision of peacetime needs, pushed ahead plans to make a complete new plant for rolling sheets, giving special care to finding a solution of such after-war problems as the greater cost of raw material, increased wages and sharper competition. Among the various plans submitted to its examination, the Terni Co. gave preference to the one proposed by G. Boscarelli, C. E., a young and well-known metallurgical expert.

The new plant built by Mr. Boscarelli at the Terni works seems to have successfully solved most of the difficulties which are being experienced in sheet rolling and has obtained the following results:

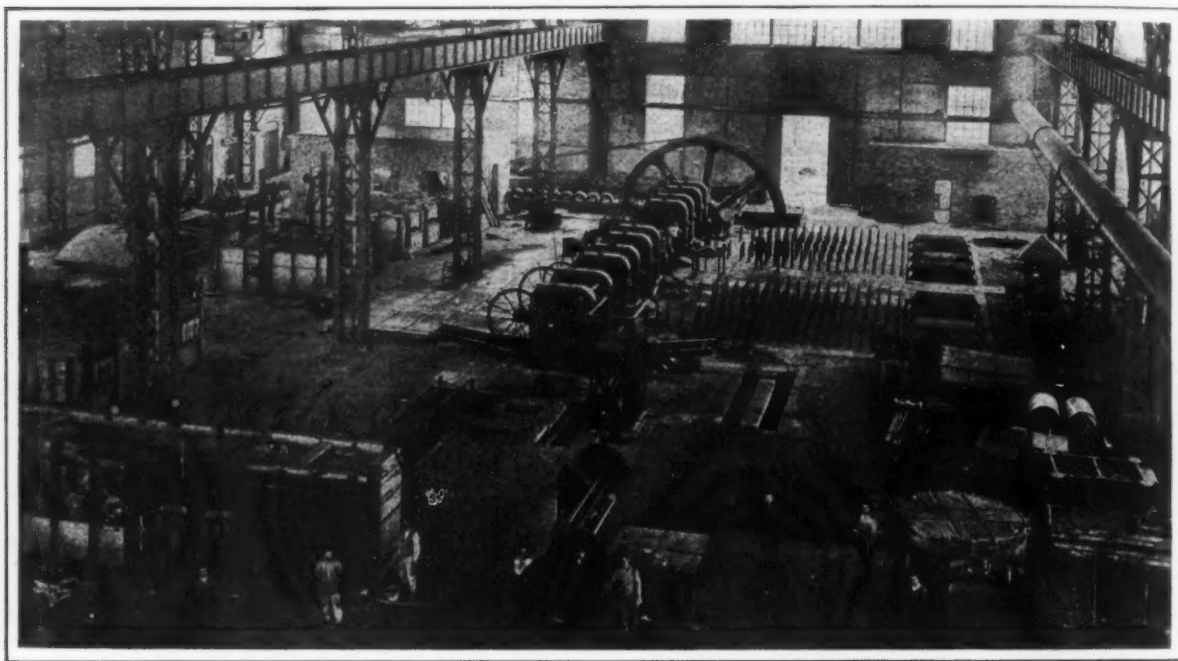
1. Its production is materially increased in comparison with the production obtained with previous installations. The adoption of a continuous furnace for sheet bars, some well thought-out mechanical appliances and, finally, a more rational distribution of work at the roughing and finishing stands are responsible for the increase of production.

2. The thickness of the sheets has been rendered more constant. Furthermore, in the new Terni plant,

of the rolls. While this device is hydraulically driven, electric or steam power can also be employed. The lifting device is provided with a special controller which arrests the bars in front of the stands; a blocking system is also provided to stop momentarily the further movement of the bars to the stands, when the lifting device is in motion. When this device is not in operation, it is lowered beneath the floor level, and a special trapdoor closes automatically upon it, in order to allow the workmen to roll the material.

In the two new rolling diagrams, Fig. 2 shows the rolling of sheets 40 x 80 in., in thicknesses varying from 0.2 to 0.7 mm (United States gage 35 to 23). The second, Fig. 3, takes in the rolling of sheets 40 x 80 in. and more, having a thickness of 0.8 to 3 mm. (United States gage 22 to 11).

At the roughing stands, Fig. 2, the sheet bars are rolled directly down to the thickness suitable for obtaining the doubled sheets, thus rendering superfluous the usual operation of reheating the roughed-out sheets. In fact, according to the ordinary procedure, the roughed-out sheets, which have been obtained through the rolling of the bars, must be heated and rolled once



General View of the New Mill, with Continuous Sheet Bar Heating Furnace in Left Foreground and 110-Ton Fly-wheel with Leather Rope Drive in Background. Sheet bars from the furnace pass to the roughing rolls through the underground passage shown. Tote boxes appear at right opposite the forest of casters, while the muffle furnaces for sheet packs are behind the columns at left

sheets can be rolled much thinner than with similar existing rolling mills.

3. A considerable saving in the cost of sheets manufactured is obtained by reducing heating operations to two only; therefore fewer hands are required and fuel consumption is cut down.

Two diagrams, Figs. 2 and 3, indicate schematically the process of sheet rolling developed by Mr. Boscarelli and successfully adopted by the Terni Steel Works. In the new sheet plant the bars are heated in a large furnace burning lignite gases; the furnace is equipped with a heat recuperator. The bars are pushed into the furnace by means of the charging machine and forced to skid on water-cooled pipes.

As soon as the bars have become heated to the right point, they are taken out of the furnace with the assistance of but one man and placed on an inclined belt conveyor, from which they are unloaded on live rollers and carried, through an underground passage, to the roughing stands.

Each train consists of two stands of roughing and two stands of finishing rolls and one of pinions. This latter is situated in the center of the train between the two roughing stands, while the finishing stands are at the outer ends of the train.

In front of each stand is placed a special automatic device for the lifting of the bars to the level

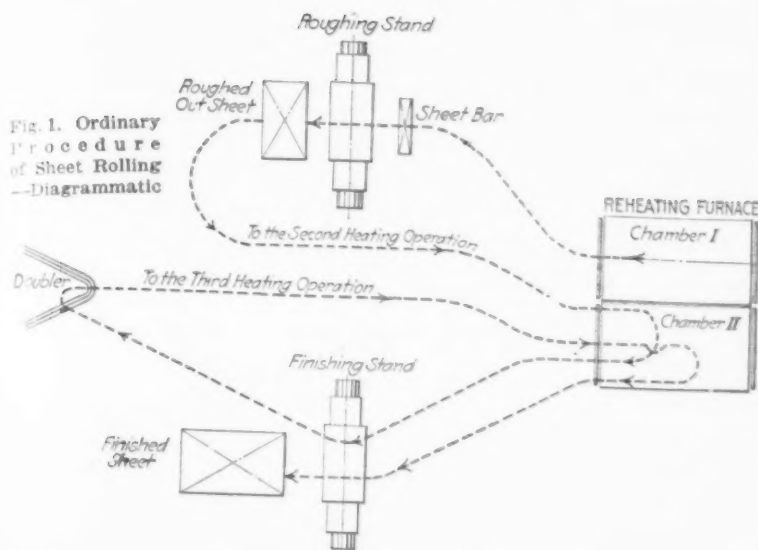
more in order to obtain sheets of the thickness needed for the doubling operation. It is therefore of particular note that in the new Terni plant, thanks to a more rational rolling process, all sheets 40 x 80 in., from 0.2 mm. up to 0.7 mm. thick, are rolled with only one reheating operation.

Diagram 3 is still more simple. In this case only the bar furnace is used, while the furnace for the sheet packs is cold. Each of the four stands acts as finishing and roughing stands at the same time, because of the fact that sheets from 0.8 to 3 mm. are obtained directly from the sheet bar, completely utilizing its first heating.

The furnaces for the sheet packs are of the muffle type, burning lignite gas, and are provided with heat recuperators. A special automatic charging device permits realizing a very useful pre-heating of the packs. In front of each pair of stands there is one of these furnaces, consisting of two chambers (pair furnaces). From each chamber the material goes to the finishing stand.

Thanks to the above-described arrangement, none of the four stands is ever idle. This renders it possible to attain a degree of uniformity and continuity of work very difficult to reach with the usual installation.

Another advantage of the new system of rolling is the regularity of the thickness, which is especially



difficult to obtain when rolling thin sheets; this is made possible by regulating the temperature of the rolls by means of a convenient cool water circulation system.

Production of sheets 40 x 80 in., of 35 to 11 gage, with this installation, can be easily brought, if necessary, from 70 to 100 tons in 24 hr. This figure represents not less than 30 to 40 per cent more than the production obtained in the same time with the usual systems and a like number of stands.

The Terni plant has been completed with two car-type annealing furnaces, each 24 meters (79 ft.) long, burning lignite gas. The car is moved by an electric capstan. The sheets are annealed as usual in special air-tight boxes, free from gases of combustion.

Lignite gases employed in the annealing and reheating furnaces are produced by a battery of gas generators placed at a distance from the mills, and are led to the furnace through an underground brick tunnel; the gases are distributed among the furnaces by means of steel piping.

There is a group of cold shears, including one crocodile shear for cutting the sheet bars and three cold shears for the finished sheets, all electrically controlled. An hydraulic press is placed near the shears department for the purpose of baling the scrap, which is then sent to the steel furnaces for remelting.

Driven by an 800-hp. electric motor, operating at 3000 volts on three-phase current, the rolling mill has a flywheel, weighing about 110 gross tons, which rests on bearings with forced lubrication, and has closed oil circulation provided with filter and serpentine cooling device. The transmission for the reduction of speed

from the motor to the flywheel is made by means of 24 leather ropes. The flywheel is directly coupled with the main shaft of the rolling mill.

To the thin rolling mill is connected a stand for the rolling of plates from 2 to 8 mm. (0.079 to 5/16 in. or 14 to 0 United States gage) thick, up to 71 in. wide and 33 ft. long. This stand is purposely added in order to render uniform the resistance diagram and to increase the production of the rolling mill both in regard to quality and quantity, as this stand can produce 100 tons of plates during 24 hr., while the other stands are rolling thin sheets. The barrel of the rolls of this stand is 6 ft. 6 in. wide. The stand is provided with hydraulically driven lifting tables. At this stand the roughed-out sheets to be rolled into finished sheets are supplied by a Lauth mill already existing at the Terni plant; the reheating takes place in a special furnace situated nearby.

The new plant, covering a surface of 7000 sq. m. (75,000 sq. ft.), includes three parallel buildings. Through the new installation and the plate mills

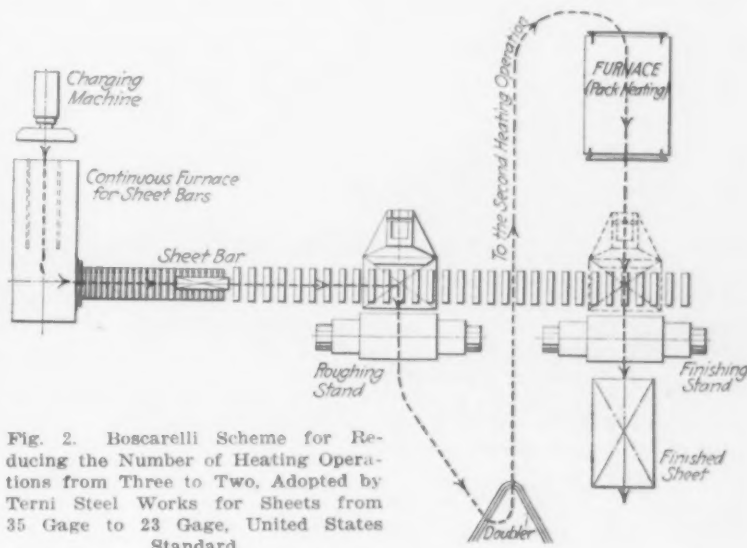


Fig. 2. Boscarelli Scheme for Reducing the Number of Heating Operations from Three to Two, Adopted by Terni Steel Works for Sheets from 35 Gage to 23 Gage, United States Standard

already existing, the Terni Steel Works is to-day in a position to manufacture the complete scale of thicknesses ranging from the minimum of No. 35 United States gage up to the heaviest armor plates for warships.

The Shenango Furnace Co., Pittsburgh, about July 1, will blow out its No. 3 blast furnace at Sharpsville, Pa., which is to be remodeled, as previously announced. A new shall will be built, the height of the furnace being increased from 88 ft. to 94 ft. and the diameter of bosh from 20 ft. to 23 ft. Other minor improvements will be made to this furnace, which at present has a capacity of 450 to 500 tons per day, and will be able to make from 550 to 600 tons of pig iron per day when improvements are completed. The stack is expected to be idle about 60 days.

The blast furnace and wood alcohol plant of the Charcoal Iron Co. of America at Ashland, Wis., resumed operations last week after a shut-down of 14 months. The resumption gives employment to 600 men.

Bookings in May by the American Bosch Magneto Corporation, Springfield, Mass., were \$860,000, or more than double those for the same month last year.

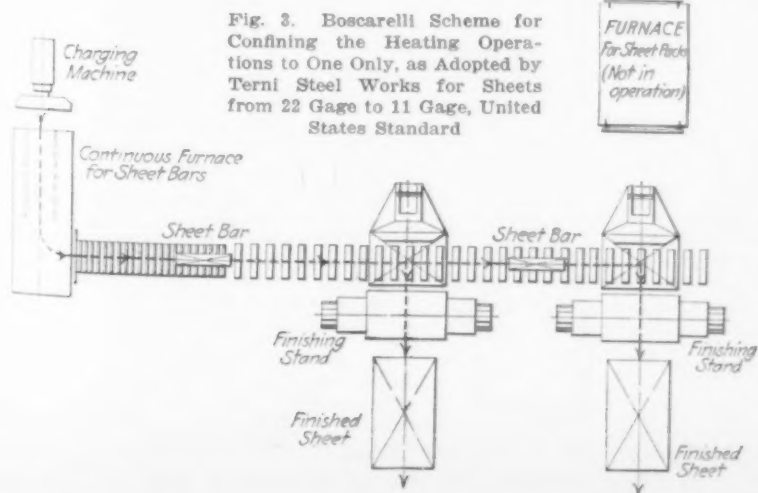


Fig. 3. Boscarelli Scheme for Confining the Heating Operations to One Only, as Adopted by Terni Steel Works for Sheets from 22 Gage to 11 Gage, United States Standard

FERROMANGANESE SUPPLIES

Output Increasing Only Slowly—Available Supplies—Spiegeleisen Production Still Light

Because of the rapid increase in steel output thus far this year and the low ebb to which the country's ferromanganese production fell last year, an analysis of the present rate of production of the manganese-iron alloys and the available supplies is of decided importance.

There has been a sharp rebound in the production of ferromanganese and spiegeleisen thus far this year from the low rate late last year. The total for the first quarter of this year was 6951 tons of ferromanganese per month as against only 3758 tons per month in the last quarter of 1921. In April the production had reached 14,998 tons; in 1920 the monthly average was 23,557 tons.

The spiegeleisen output for the first quarter of this year was 2752 tons per month as compared with none in the last quarter of last year and only 1338 tons per month in the third quarter. The April output was 4211 tons and in 1920 the rate was 8620 tons per month.

The following table gives the output of ferromanganese and spiegeleisen for the first quarter of 1922 compared with previous records:

Ferromanganese and Spiegeleisen Output of the United States in Gross Tons

	Ferromanganese	Spiegeleisen	Total	Average Per Mo.
January, 1922.....	5,644	1,230	6,874	....
February, 1922.....	3,610	4,930	8,540	....
March, 1922.....	11,600	2,095	13,695	....
First quarter, 1922, average per month.....	6,951	2,752	9,703	....
April, 1922.....	14,998	4,211	19,209	....
Total, 1921.....	98,439	56,139	154,578	12,881
Total, 1920.....	282,681	103,448	386,129	32,177
Total, 1919.....	179,029	65,391	244,470	20,732
Total, 1918.....	345,306	249,002	594,308	49,525
Total, 1913.....	119,495	126,081	245,576	20,464

The April output of ferromanganese is nearly equal to that of both February and March combined and is practically the same as the monthly average in 1919 of 14,923 tons per month. The spiegeleisen production thus far this year is insignificant as compared with the rate of 10,507 tons per month in 1913 or 5450 tons per month in 1919. Even at the low point in 1921 the rate of 4678 tons per month exceeds the present production rate.

Available Supplies

The available supplies of ferromanganese for 1921 and previous years, as obtained from an analysis of the output, imports and exports were as follows:

Ferromanganese Output, Imports and Exports, and Available Supplies, in Gross Tons

	Output	Imports	Exports	Available Supplies
January, 1922.....	5,644	1,300	121	6,823
February, 1922.....	3,610	1,041	190	4,461
March, 1922.....	11,600	3,819	81	15,338
First quarter, 1922, average per month.....	6,951	2,053	130	8,874
April, 1922.....	14,998	2,380	241	17,137
Average per month, 1921.....	8,203	755	57	8,901
Average per month, 1920.....	23,557	4,941	288	28,210
Average per month, 1919.....	14,923	2,752	255	17,420
Average per month, 1918.....	28,775	2,264	298	30,741
Average per month, 1917.....	21,486	3,703	*776	25,413
Average per month, 1916.....	17,365	7,577	...	...
Average per month, 1915.....	12,021	4,605	...	...
Average per month, 1913.....	9,958	10,672	...	...
Average per month, 1911.....	6,207	6,688	...	12,895
5-year average (1910-14) per month.....	8,280	8,399	...	...

*First half only.

Available supplies in 1921 fell to an average of only 8901 tons per month, but there was a sharp rebound in March and April this year. They will be much heavier as the year progresses. The above data show these supplies to have been 15,338 tons for March and 17,137 tons for April, or practically twice those of 1921.

A feature of these data is the increase in imports, largely British alloy. For the first quarter of this year these have been 2053 tons per month as against only 755 tons per month in 1921, or a gain of nearly three-fold. Exports have never attained a large volume.

Manganese Ore Imports

Manganese ore imports thus far this year have been increasing moderately, having been 10,609 tons per

month for the first quarter, rising to 25,559 tons in April. In the last quarter of last year they were 20,093 tons per month, with the average for 1921 at 33,446 tons per month. The record was 52,498 tons per month in 1917. Imports for the first quarter of this year compared with other periods were as follows:

Manganese Ore Imports in the United States in Gross Tons

	Total	Average Per Month
January, 1922.....	9,500	....
February, 1922.....	7,204	....
March, 1922.....	15,124	....
First quarter, 1922.....	31,828	10,609
April, 1922.....	25,559	....
Total, 1921.....	401,354	33,446
Total, 1920.....	606,937	50,578
Total, 1919.....	332,344	27,779
Total, 1918.....	491,303	40,942
Total, 1917.....	629,972	52,498
Total, 1916.....	576,324	48,027
Total, 1915.....	320,784	26,732
Total, 1913.....	345,084	28,858

Compared with 1913 the present rate is only about one-third, or 10,609 tons, for the first quarter, and 28,858 tons per month for 1913.

British Supplies of Manganese Ore

A very sharp decline has been registered in British supplies of manganese ore as reflected by the official import statistics. The following table shows these imports for the first quarter of this year and other years:

British Imports of Manganese Ore

	Total	Average Per Month
January, 1922.....	3,806	....
February, 1922.....	6,884	....
March, 1922.....	11,141	....
First quarter, 1922.....	21,831	7,277
April, 1922.....	8,712	....
Total, 1921.....	172,856	14,405
Total, 1920.....	452,613	37,718
Total, 1919.....	265,800	22,150
Total, 1918.....	365,606	30,467
Total, 1917.....	331,264	27,605
Total, 1916.....	439,509	36,625
Total, 1915.....	377,324	31,443
Total, 1914.....	479,435	39,953
Total, 1913.....	601,177	50,098

The feature of these data is that British imports thus far this year are less than half the monthly rate in 1921 and only about one-seventh of the record imports in 1913 of 50,098 tons per month.

Supplies and Needs in 1922

Not long after the United States entered the war it was officially estimated that the monthly needs of the steel industry were 28,000 tons of ferromanganese. This was based on the use of 80 per cent alloy and a steel output of about 43,000,000 gross tons. In THE IRON AGE of May 13, 1920, it was estimated that with a steel production of ingots and castings of 45,000,000 about 316,000 tons of ferromanganese would be theoretically necessary. The 1922 production of steel, based on official reports thus far this year, is at the rate of about 38,000,000 gross tons. Assuming that the ferromanganese output will average, for the remaining eight months since April, 15,000 tons per month (the April output), the year's total will approximate 155,850 tons. With imports from April on at 3000 tons per month, the total for the year will be close to 32,500 tons. Estimating this year's exports at 1040 tons, the available supplies for the year will approximate 187,350 tons. Theoretically a 3,000,000-ton output of steel will require about 266,800 tons of ferromanganese. By the end of the year, therefore, there would be an apparent theoretical deficiency of about 79,490 tons. Increased production or imports may overcome this deficiency, if the coal strike does not reduce output.

The Crane Co., manufacturer of valves, pipe fittings, steam specialties and miscellaneous power plant equipment, with headquarters at Chicago, and plants and branches throughout the country, a few years ago inaugurated a policy of granting a two weeks' vacation to employees in all departments who had been in the service of the company for 25 years. It has now granted an extra day's vacation for each year of service in excess of the 25-year period. There are approximately 390 veterans in the organization who have been with the company 25 years or more.

American versus British Gray Cast Iron*

American Irons Claimed Inferior—Methods of Testing Compared
—Sulphur Not Regarded Very Dangerous—Effect of Blast
Furnace Pressures and Speed

BY F. J. COOK

RIGHTLY or wrongly, the average British engineer and foundrymen considers that American gray cast irons of their respective class are inferior in physical properties to those of Great Britain. He bases his opinion, first of all, upon the undoubtedly poor wearing qualities of the cast iron which some years ago formed the material of the large quantities of machine tools sent to England. It was commonly

Writers of scientific papers in America frequently refer to the failure of cast iron parts under superheated steam. This is very unusual in this country, gray iron castings being sufficiently strong to withstand working temperatures and pressures quite equal to those under which American castings have broken down. The composition is not widely different from the American irons which have proved unsuitable.

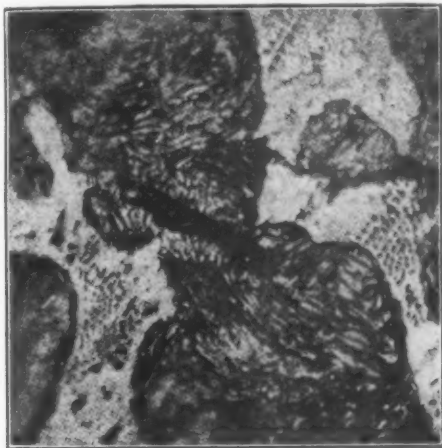


Fig. 1 (Upper).—Gray Cast Iron, Tensile Strength of 41,216 Lb. per Sq. In.; Magnification 1000 X

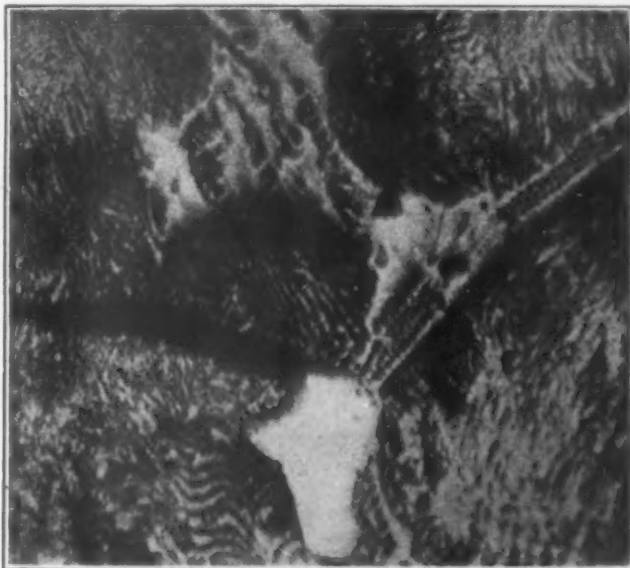


Fig. 2 (Right).—Gray Cast Iron, Tensile Strength of 44,486 Lb. per Sq. In.; Magnification 1000 X

said that the cast iron was so soft as to be easily cut with a pocket-knife, a statement often enough literally correct.

Some Poor American Irons

Recently, some improvement has been noticed, attributed partly to wider bearing surfaces and the application of chills on wearing parts, combined with the use of semi-steel. Nevertheless experiences are still related, in connection with the war, showing that American material frequently left a good deal to be desired. The author was familiar with an American machine supplied by a well-known maker which was commandeered by the government for a special operation in connection with parts for large guns. Owing to the poor quality of the cast iron the machine was constantly breaking down. No fault could be found with the design, yet, owing to the long periods when it was out of commission through breakdowns, the output was less than that obtained from an improvised old machine. It was necessary to replace the broken parts with casting produced from local irons, utilizing the broken portions for patterns. These substituted parts proved quite satisfactory, and there was some foundation for the statement, although not strictly and literally true, that the only part remaining of the original cast iron in the machine at the end of the war was the name plate on the bed.

*This paper, slightly abridged, is one of a series on foundry problems being exchanged between the Institution of British Foundrymen and the American Foundrymen's association. The first, prepared by George K. Elliott of the America Foundrymen's association, was presented at the 1921 meeting of the Institution of British Foundrymen. The author, F. J. Cook, is one of the outstanding figures in the British foundry industry. He is a past president of the Institution of British Foundrymen, and is manager of Rudge-Littley, Ltd., West Bromwich, near Birmingham.

Some years ago an American technical journal with which the author was familiar regularly gave reports of burst flywheels, until at last it became quite natural to look for them. English engineers regularly engaged in designing cast iron flywheels up to a weight of 56,000 lb. have periphery speeds of not less than 100 ft. per sec. sometimes wondered as to the character of the remarkable material of which the American wheels were made.

One of the results of the war has been a more frequent interchange of visits and we consider ourselves specially favored in the visits we have received from many leading American foundrymen. We hope they will pardon the amusement we have derived from the very candid opinions they have expressed in regard to us and our institution in the old days before, like the Queen of Sheba, they came to see for themselves. One American, for example, expressed the belief that British foundries were generally so badly lighted that an electric torch was necessary to find one's way about in them; moreover the molding shops were so low that one had to be careful not to knock his head against the roof principals. He was candid enough to say that the first British molding shop he entered fairly took away his breath. He discovered that he had only seen a small part of the whole, and was a little surprised at the offer of his guide that "any time he had a week to spare they would be pleased to show him the remainder." As a matter of fact he was in the largest foundry in the world.

The author has to admit that up to the present he has been among the stay-at-homes and is quite prepared to find that his references to American practice will furnish foundrymen on the other side of the Atlantic with at least as much amusement as Britishers

have derived from Americans and their opinions of Great Britain. The great purpose of the paper, however, is to furnish a basis for a good discussion.

It is proposed to limit its scope to the consideration of gray cast iron made from commercial pig irons, and cast iron scrap melted in a cupola by means of coke, and without the addition of steel or any ferrous or non-ferrous materials introduced either into the cupola or the ladle of molten metal.

Mechanical Tests for Gray Iron

When one comes to mechanical tests, the conditions relating to mechanical tests for cast iron vary considerably in the two countries. Little importance appears to be attached in America to tensile testing, while the size of the transverse bars tested equally with the method of testing differs widely from British practice. The ruling tests for cast iron may be said to comprise in Great Britain: For pipes, constructional and general engineering work for more or less rough and large character, transverse bars, 2 in. deep, 1 in. thick and tested deep part down on centers 3 ft. apart; for engine details other than cylinders, transverse bars 1 in. sq. tested on centers 12 in. apart. It is also becoming more general in the finer classes of engine work to cast the transverse bars 1½ in. sq., machining down to 1 in. sq. to insure accuracy. For cylinders of all descriptions tensile bars are demanded, exactly of the same material as the castings they are to represent. Practically every tensile bar has to be tested in the presence of an inspector, and the casting of the bars on the job therefore, generally gives more satisfaction and prevents the suspicion which might possibly arise if the bar was separately cast without the presence of the inspector. There is a great deal also to be said in favor of the tensile test for cylinders, since the castings themselves are necessarily subjected to tension. Moreover a tensile test gives a better indication of the wearing properties of this class of iron than any other test known to the author.

It may possibly be that the apathy with which the tensile test in America is regarded may to some extent be due to certain conditions named by Dr. Moldenke, though of that, of course, the author is not in a position to judge. Dr. Moldenke says:*

"In this country (America) you will find about 99 out of 100 testing machines that are not in proper condition for the tensile test. On the other side they calibrate the machines often, and they have their governments to test them."

There can be no gainsaying his statement on the same page that "for scientific investigation the tensile bar is preferable."

The reading of American scientific papers and of the technical press conveys the impression that a tensile test going a little beyond 31,360 lb. per sq. in. is considered worthy of special notice; certainly in this country anything like this would be considered quite mediocre. Ernest Wheeler, Manchester Association of Engineers, *Proceedings*, 1921, representing Messrs. Crossley Bros., Ltd., Manchester, states that he has found it "quite possible, without the aid of steel to prepare and obtain mixtures of cast iron having a tensile strength of over 18 tons (40,320 lb.) per sq. in.," and this is confirmed by other workers in the same field. The same gentleman has prepared for the author a bar cast in accordance with the specification for the "Arbitration bar" which has given a result of 39,200 lb.

TABLE 1.—Results of Tensile Tests on British Iron Castings.

Analysis						Tensile test equivalent, lb. per sq. in. on Arbitration Bar	
C. C.	G. C.	P.	Si.	S.	Mn.	lb. per sq. in.	on Arbitration Bar
0.98	2.074	0.974	1.213	0.146	0.324	32704	5146
0.84	2.214	1.046	1.166	0.136	0.432	32720	5146
0.89	2.410	1.140	1.40	0.134	0.453	36064	5146
0.665	2.498	1.186	1.40	0.136	0.465	39200	5373
0.84	2.432	0.981	1.143	0.137	0.288	41440	5562
0.72	2.49	1.2	1.49	0.126	0.420	44486	5600

A short time ago the author tabulated his average tensile test results over a working period of 500 consecutive days. The average figure was 36,288 lb. per sq. in.; no test was as low as 30,240 lb., while the high-

est figure reached was 43,008 lb. All the bars were 1½ in. diameter and were cast on the castings they were to represent—not separate—and were turned down in the middle to ½-sq. in. area before testing. A typical range of tensile test results with this class of iron with the analyses is shown in Table 1.

For mechanical tests to be strictly comparable it is essential that the bars should be of the same dimensions and similarly molded, gated, cast and tested. It may be argued that the tensile test results given in Table 1 are not comparable to those obtained by the American arbitration bar. But the author suggests that the advantage has not been with those cited. The bars were of the same dimensions as the arbitration bar, and they certainly had the advantage of static pressure due to casting head, as they are placed on the middle joint of short stroke cylinders. They have one disadvantage, however, in that they were cast with cooler metal than if they had been cast from a small ladle direct from a cupola. The disadvantages of all these conditions were well set out in the admirable exchange paper presented by George K. Elliott to the Institution of British Foundrymen last September.

Comparisons between the transverse tests made in the two countries are necessarily hampered by serious difficulties, chiefly on account of the difference in shape and dimensions of the bars used. The arbitration bar has a diameter of 1½ in. and is tested as cast, on centers 12 in. apart. The bars with which the author is familiar and of which particulars are given later are cast 1½ in. sq., machined down to 1 in. sq., tested on 12-in. centers, and cast on to castings, as previously defined in connection with the tensile test. In the absence of an available machine suitable for taking a bar of 1½ in. it has been necessary to evolve a constant which will reconcile the differences of dimensions in the two bars.

The results of the arbitration bar can be converted into those comparable for a 1-in. sq. bar tested on the same center by multiplying the breaking load obtained by 0.74; conversely the result obtained on the 1-in. sq. bar divided by 0.74 will give the equivalent load on the arbitration bar. (The formula used for obtaining this factor is given in the paper.)

In the discussion on Mr. Elliott's paper already referred to, the author gave some details of 25 transverse tests of bars giving an equivalent average breaking load on an arbitration bar of 5300 lb.; the lowest bar gave an equivalent load of 5146 lb. and the highest 5600. The minimum load is a higher figure than that obtained by Mr. Elliott with American metal having a similar silicon content, but with lower phosphorus and sulphur after undergoing the refining action of an electric furnace. Table 1 gives particulars of the transverse results brought up to an equivalent on the arbitration bar relative to bars cast on the same cylinders as those selected for tensile example.

Keep's Tests Compared

Although the two previous tests are not in the strictest sense comparable, there is a mechanical test common to both countries, namely Keep's shrinkage and transverse test. In Great Britain we consider Mr. Keep knows all about the mechanical tests that American irons will stand. The results shown in Table 2 of tests made with the same class of iron as those dealt with in Table 1 are not only typical of results obtained by the author but of those secured by other workers.

TABLE 2.—Keep's Tests on British Cast Iron.

Shrinkage	Transverse Breaking Load	Deflection
in. in.	in. lb.	in. in.
0.146	550	0.14
0.161	600	0.15
0.157	650	0.18
0.158	675	0.19
0.159	700	0.21
0.161	800	0.23

30 tests on this same size bar gave an average breaking load of 622 lb.

The general practice differs somewhat between the two countries in regard to the allowable percentage of the chemical elements in different classes of gray cast iron. This is undoubtedly due to prevailing differences in the irons and not to a lack of metallurgical knowl-

*A. F. A. Transactions, Vol. XXII, page 368.

edge. With one or two notable exceptions, practical foundrymen in America appear to pay little attention to total carbon. While carbon receives special attention and is frequently mentioned, it is only lately that total carbon has had due consideration. The quantity of combined carbon is important, but it is obvious that with varying amounts of total carbon the same percentage of combined carbon will have a different effect. Dr. Stead has shown examples in which increases of 0.1 per cent of graphite have reduced transverse strength by 224 lb. and tensile strength by 1792 lb. per sq. in.

Silicon receives a great amount of attention in American foundry practice and in conjunction with sulphur appears to be regarded as the Alpha and Omega by the purchasers of pig irons. One hears a great deal of "silicon control." In Great Britain silicon is merely considered with all the other elements entering into a commercial analysis. [The author gives a formula for the ratio of silicon to carbon in gray iron castings.]

Effect of Sulphur and Phosphorus

At one time in this country sulphur was considered the arch enemy of the ironfounder, although probably it is not taken quite so seriously as it is in America. In his exchange paper George K. Elliott considers that sulphur above 0.07 per cent is dangerous. This does not agree with the results of Coe's* research on British irons. Coe found that sulphur within the limits of his work did not increase the brittleness of cast iron but appears to increase resistance to fracture.

In Table 1 the sulphur appears in a proportion twice the amount which Mr. Elliott considered dangerous, yet it does not appear to have prevented a high degree of strength. A liberal proportion, up to 0.12 per cent, has in the author's experience been found to have a beneficial effect upon the wearing properties of cylinders and liners subjected to heat conditions.

To an appreciable extent phosphorus is considered in America to be detrimental to the strength of gray cast iron. George K. Elliott in his paper states "Irons of greatest strength contain only a small amount of phosphorus." Dr. Moldenke in *Principles of Iron Founding* appears to put the limit for strong castings free from strains at 0.4 per cent. The author's experience points to the conclusion that with the strongest British irons the *distribution of the phosphorus*, provided the amount does not exceed 1 per cent, is more important than the actual quantity present.

Agreement appears to be more general in regard to the benefit to be derived from the poling action of manganese, but the author believes that manganese to the extent of 1 per cent or over is detrimental to good wearing properties under heat conditions. This element has a way of developing spiky crystals which break off under rubbing and prevent the formation of that highly polished surface generally regarded as the distinguishing characteristic of all good wearing cast iron.

The Microscope and Cast Iron

Although chemical analysis necessarily forms the basis of all scientific work in regard to cast iron, unfortunately it does not follow that similar analyses necessarily involve similar physical properties. It is also admitted that strong gray cast irons are associated with the matrix consisting of fairly large areas of well defined laminated pearlite, relatively stiff portions of cementite and small graphite, and these formations are illustrated by typical examples in Figs. 1 and 2.

While the microscope is a useful adjunct to chemical analysis the utility of the micrograph is limited; it being impossible to determine therefrom relative physical properties of specimens with mathematical precision, or to ascertain within narrow limits the relative variations.

Occasionally, it is quite impossible in dealing with this class of iron to discover either by chemical analysis or the usual methods of microscopic examination great differences in physical properties. An interesting example of this took place some time ago. It was found

that the highest tensile test obtained in 60 consecutive days' workings was lower than the lowest tensile test during the next 60 days. The metal was of similar chemical analysis but the mixture had been varied by introducing a different pig iron brand as one of the three constituting the charge. A research was carried out by the late George Hailstone and the author in connection with this class of investigation. All the methods usually employed for detecting the cause of difference in physical properties such as chemical analysis, high and low power microscopic analysis and the employment of various etching agents failed to show any reasonable cause for the great difference which existed.

The author has made many hundreds of examinations in order to test this and has never found a single example to the contrary. The network formation is apparent at about 26,880 lb. tensile strength and be-

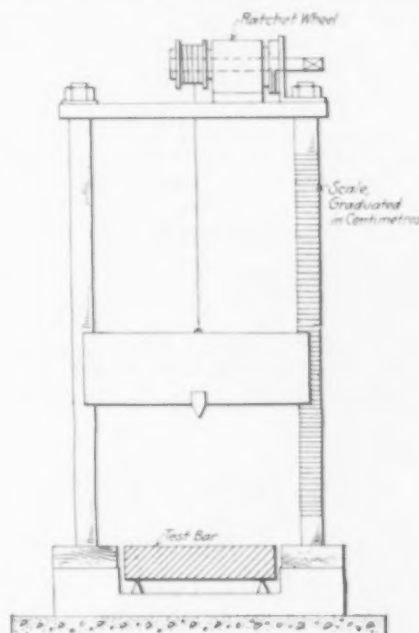


Fig. 3.—Machine Used in Europe for Testing Gray Iron for Shock Resisting Properties

comes more pronounced as the strength increases. In the author's view this method gives a surer approximation of the physical properties of the metal than any other form of metallography and is often superior to chemical analysis.

Blast Furnace Temperatures

In connection with the research already referred to the authors, as one of their conclusions, decided that the temperature at which the pig iron is made in the blast furnace has a direct effect upon the formation of this network structure. At the time this statement aroused a great amount of criticism, one professor stating that after remelting the iron had forgotten all about the hole from which it had been dug. Time has since proved the inaccuracy of this view and it is now clear that the temperature of the blast furnace has a marked effect upon the physical properties of the metal, and that these are maintained after remelting.

One progressive blast furnace manager has found that pig iron having this network structure, after going through the puddling furnace, yields wrought iron with higher physical properties than is to be obtained from a pig iron of similar analysis without this structure. He discovered further that with similar working and furnace burden the network structure was controlled by the blast temperature. When using a blast temperature of 900 deg. Fahr. he is always able to get the network structure; whereas if the temperature is increased the network diminishes until at 1100 deg. it disappears entirely with a corresponding lowering of physical properties of the wrought iron, the general chemical composition of the metal being the same. As the result of these discoveries the blast furnace manager has now fitted his furnace with pyrometers for

*British Foundrymen's Association Proceedings 1911-12.

recording the temperature of the blast and is able thereby to obtain more regularly consistent results.

The fundamental law governing the phenomena of the formation of the network structure has not so far been definitely and satisfactorily proved. J. E. Fletcher, however, has furnished an explanation which has the greatest degree of probability. Mr. Fletcher is advising director to the British Cast Iron and Wrought Iron associations and has devoted much thought and research to the elucidation of this problem in connection both with the blast furnace and the cupola. He believes:

That this structure follows the original boundaries between the crystals of the metal which is first fused during the descent of the iron to the fusion zone in the blast furnace. The carburization of the crystals follows their boundaries just as decarburization follows them in the mechanism of the malleablizing process.

If the blast penetration effect while passing the tuyere zones is drastically oxidizing, following rapid carburization in hot blast furnaces, then the strong boundary-intercohesion is more or less destroyed, with possible gas and oxide inclusions along the boundary films.

With the soft blast of cool or cold blast furnaces this action is absent, and the intercohesion strength of the crystalline structure, due to the presence of combined carbon and air—unimpaired by gaseous and iron oxides and minute slag inclusions—is maintained.

An European Testing Machine

A test becoming general in Europe for cast irons of the highest physical properties, more particularly in connection with casting for diesel and large gas engine piston and cylinder liners is the shock test. This is carried out by testing a bar cast 40 mm. sq. supported on knife edges 160 mm. apart by dropping onto it a

weight of 12 kg. from varying heights. Attached to the weight in such a way as to strike the bar in the center parallel to the supporting knife edges is fixed another knife edge. The face of all the knife edges are rounded to a 1/16-in. radius. So far as the author is aware this test is not in use in America. A general arrangement of such a machine is shown in Fig. 3.

In carrying out a shock test we commence with a drop of the weight from a height of 30 cm. increasing the height of the drop by increments of 5 cm. until the sample breaks, the height at which the bar eventually breaks being taken as the test figure. A result of 55 cm. is considered none too high for the class of work named although it is quite a severe test. The maximum attained by the author has been 88 cm.

Mr. Wheeler uses the same sized bar and machine as a fatigue test, but for this commences with a drop of 28 cm. and increases by heights of 1 cm. The number of blows required to fracture the sample should be taken as the fatigue test numeral. A bar from the same metal as the tensile bar of Mr. Wheeler's referred to in the early part of the paper withstood 30 blows, having a range from 28 to 57 cm.

In conclusion if, as has been suggested in the first part of this paper, there is a wide difference in the strength of the respective gray cast irons, of which some particulars in regard to the British have been given, the author would suggest the query whether this may not be due to the slow running furnaces in Great Britain producing metal having better properties than that made by the large, fast running furnaces which appear to be general in America. Unfortunately, even in this country, the slow running furnaces are diminishing in number.

MAY STEEL OUTPUT

Ingot Production at a Rate of Nearly 82 Per Cent of Output of 1917 and 3000 Tons More a Day Than in April

The production of steel ingots for the entire country for the 27 steel making days of May appears to be 114,784 gross tons per day. This is at a rate of nearly 35,700,000 tons per annum, or nearly 82 per cent of the actual production of the year 1917.

In terms of what was actually produced in ingots in 1921, the American Iron and Steel Institute now finds that the 30 companies reporting to it made 87.48 per cent of the total. This accordingly indicates that the production so far in 1922 has not been so large as estimated on the earlier returns, which were based on the reporting companies' making only 84.2 per cent of the total, as was the case in 1920. Assuming that the 12.52 per cent of capacity not reporting made a proportionate output, a revision of the daily steel ingot output for this year and also for 1921 is given in the accompanying table.

Estimated Daily Output of Steel Ingots

	Gross Tons		Gross Tons
Jan., 1921	95,920	Oct.	71,100
Feb.	82,440	Nov.	73,000
March	65,805	Dec.	65,262
April	53,375	Jan., 1922	70,059
May	55,658	Feb.	83,005
June	45,890	March	100,390
July	36,704	April	111,775
August	48,193	May	114,784
Sept.	52,672		

As shown in the table below, the steel ingot statistics of the American Iron and Steel Institute, show that 30 companies, which in 1921 made 87.48 per cent of the total, had an output in May of 2,711,141 tons, against 2,444,513 tons, the revised figure for April. On the assumption that the companies not reporting produced at the same rate, the output for the 27 working days of May was 3,100,000 gross tons, or 114,784 tons per day. On the same basis the output in April, using the revised figures, is 2,794,300 tons, or 111,775 tons for each of the 25 working days in April.

The May output, day for day, is nearly 64 per cent better than that of January. The indicated total for

the five months of this year is 12,400,000 gross tons or 5 million tons below the output for the corresponding period of 1920.

Monthly Production of Steel Ingots by 30 Companies Which Made 87.48 Per Cent of Total in 1921—Gross Tons

Months	Open Hearth	Bessemer	All Other	Total
January, 1920..	2,242,758	714,657	10,687	2,968,102
February	2,152,106	700,151	12,867	2,865,124
March	2,487,245	795,164	16,640	3,299,049
April	2,056,336	568,952	13,017	2,635,305
May	2,251,544	615,932	15,688	2,883,164
June	2,287,273	675,954	17,463	2,980,690
July	2,135,633	653,888	13,297	2,802,818
August	2,299,645	695,003	5,784	3,000,432
September	2,300,417	693,586	5,548	2,999,551
October	2,335,863	676,634	3,485	3,015,982
November	1,961,861	673,215	3,594	2,638,670
December	1,687,162	649,617	3,586	2,340,365
Total	26,197,843	8,112,753	121,656	34,432,252
Months	Open Hearth	Bessemer	All Other	Total
January, 1921..	1,591,281	608,276	3,629	2,203,186
February	1,295,863	450,818	2,796	1,749,477
March	1,175,591	392,983	2,404	1,570,978
April	1,000,053	211,755	2,150	1,213,958
May	1,047,810	216,497	1,543	1,265,850
June	808,286	193,644	1,476	1,003,406
July	689,489	113,312	575	803,376
August	915,334	221,116	1,621	1,138,071
September	908,381	265,152	1,207	1,174,740
October	1,269,945	345,837	1,028	1,616,810
November	1,294,371	363,912	1,718	1,660,001
December	1,129,174	296,380	1,539	1,427,093
Total	13,125,578	3,679,682	21,686	16,826,946
Months	Open Hearth	Bessemer	All Other	Total
January, 1922..	1,260,809	331,851	822	1,593,482
February	1,395,835	348,571	616	1,745,022
March	1,918,570	451,386	795	2,370,751
April	1,997,465*	445,939	1,109	2,444,513*
May	2,214,774	494,893	1,474	2,711,141
Total, 5 mo..	8,787,453	2,072,640	4,816	10,864,909

*Revised.

A translation, editorial and research bureau, intended to serve in the development of industry and international trade, has been opened by the Thermo Engineering Co., 52 Vanderbilt Avenue, New York. The bureau is prepared to make translations of engineering or business letters, pamphlets, documents, specifications and catalogs from English, French, German, Spanish or Russian, and into any of these languages. Arrangements have also been made for preparing charts, diagrams and curves to illustrate matters otherwise handled only by words and figures.

American Foundrymen Meet at Rochester

International Session a Feature—Important Meetings on Steel, Gray and Malleable Iron—Sand Problems Discussed—The Exhibit a Pronounced Success

AFTER a lapse of about 20 months, or since the last meeting in Columbus, Ohio, early in October, 1920, the American Foundrymen's Association held its regular annual convention and exhibition in Rochester, N. Y., last week, June 5 to 9. The Columbus meeting took place at about the time there appeared signs of the serious business depression which followed in 1921; the Rochester meeting occurred with evidences of prosperity more promising than in many months. Undoubtedly the absence of pronounced assurance as to business recovery and stability had its effect, but nevertheless, under the conditions prevailing, the Rochester affair will be recorded as among the most eventful and successful ever held from many points of view.

The attendance and registration at the technical sessions and the exhibition were large and satisfactory. The location was ideal, Exposition Park affording a commodious space for exhibits and excellent auditoriums for the presentation of technical papers. The latter phase made it more possible than was the case at Columbus to hear and discuss the varied programs. Interesting sessions were held on steel foundry and gray iron topics, on malleable iron and molding sand, on industrial relations with four sessions on non-ferrous matters held as joint meetings with the American Institute of Mining and Metallurgical Engineers. There was the notable international session as the convention's feature as well as the usual banquet and social features.

The First International Foundry Session

AN epoch in the history of the American Foundrymen's Association was established when the first important meeting of the 26th annual meeting of the association was called to order Tuesday morning, June 6, by the Chairman, A. O. Backert, one of the association's past presidents. It was the first specially planned international session in the association's history and was a signal success. The chairman, in his opening remarks, after calling attention to the notable character of the meeting, introduced successively representatives of the foundry associations of Great Britain, France and Belgium. He prefaced the introduction of these representatives with the statement that the first step in this movement was the reading last year of a paper from a representative of the American foundrymen before the Institution of British Foundrymen by George K. Elliott, chief metallurgist Lunkenheimer Co., Cincinnati, at which time it was arranged that a similar exchange should take place at this meeting.

The distinguished visitors were F. J. Cook, of Birmingham, England, past president of the Institution of British Foundrymen; Raymond Gailly, of Charleroi, Belgium, representing French foundrymen, and Marcel Remy, Herstal, Belgium, representing Belgian foundrymen. Monsieur Gailly read letters of greeting from the Association Technique de Fonderie de Paris and from the Liège Foundry Technical Association, and Mr. Cook read a cablegram of heartiest greetings and best wishes for the success of the international meeting from Oliver Stubbs, and Thomas Firth, of the Institution of British Foundrymen, who recently completed a tour of some representative American foundries. A most hearty greeting was extended by the members present to each introduction. By a unanimous vote, the chairman appointed a committee to draft a message of good will to the various members of the European foundrymen associations, the committee consisting of C. R. Messinger, R. A. Bull and G. H. Clamer.

American and British Iron Castings

The feature among the technical papers presented at this meeting was the exchange paper from a member of the British Foundrymen entitled "American Versus British Cast Iron," which was presented in abstract by the author, F. J. Cook, Rudge-Littley, Ltd., Birmingham, England. A full abstract of this paper appears elsewhere in this issue.

Before throwing this paper open to discussion, two other papers were presented, so that the discussion could cover the three papers. The first of these, entitled "Annealing of Gray Iron," by J. F. Harper and R. S. McPherron, Allis-Chalmers Mfg. Co., Milwaukee, Wis., was presented in abstract by Mr. Harper. The other, "Cupola Melting Tests with Mixtures Changing During Run," by Dr. Richard Moldenke, Watchung, N. J., was presented in abstract by the author.

Annealing Gray Iron

The paper on the important subject of annealing gray cast iron represents an investigation which was conducted to ascertain the correct time and temperature for annealing such castings and to determine the effect of both annealing and quenching on the physical proportions. According to the conclusions of the authors, based upon the results, the temperature of 1150 deg. Fahr. for one hour should not be exceeded

when the object of the annealing is to relieve machine or casting strains. Annealing at 1050 deg. does not apparently decrease to any great extent the hardness or strength. In order to increase the machinability only, temperatures from 1450 to 1550 deg. Fahr. are satisfactory, but the drop in hardness involves a sacrifice of the strength. From the tests the authors say that until the temperature exceeds the critical point, the rate of cooling has no effect on the physical proportions of cast iron. The paper is fully illustrated with photomicrographs and charts which were thrown on the screen.

Cupola Mixture Changes

Dr. Moldenke in his paper dealt with one chapter of an extensive investigation which he is conducting of the use of Cuban iron ores containing nickel and chromium as incorporated in various kinds of iron castings. Prefacing the introduction of his subject, Dr. Moldenke said that foundrymen who require several different mixtures of iron from the cupola usually adopt the practice of running special charges in the first part of the history. His paper deals with the problem of keeping the mixtures in such a case separate from each other. He stated that such nickel-chromium irons are so different from other irons used ordinarily, that it is possible to trace their behavior in the cupola. In the test to which he refers, the first

charge contains no Cuban iron; the second had 10 per cent; the third, 15 per cent, and the fourth, 20 per cent. Each charge was separated even more carefully than usually by extra amounts of coke. The first melt from the cupola showed an average content of 0.10 per cent nickel and 0.23 per cent chromium, despite the fact that none of the iron containing even a small amount of these elements was used in the first charge. Dr. Moldenke, therefore, concluded that the iron from the Cuban ores in the upper charges melted before the metal below had been used up and draws the conclusion that melting takes place higher in the cupola than is supposed. As a result of these tests, Dr. Moldenke severely condemns the practice of placing the pig iron of a mixture around the rim of the charge with the scrap in the center and insists that it is of the utmost importance to charge metal and scrap uniformly in their several layers, so that whether melting takes place in the upper charges or not, whatever does drop down will consist of the right proportions in the mixture.

Discussion

Mr. Cook, at the conclusion of the presentation of his paper, expressed his personal appreciation of the good feeling existing between the British and American associations and said that the British eagerly accepted the idea of an exchange of papers and of the arrangement of closer relations. He dwelt upon the effect of the size of the graphite as being of large importance, other things being equal, and he stated that in a case of two irons, one having a tensile strength of 43,008 lb. and another of 41,216 lb. sq. in., he had found by actual measurement the length of the graphite grains or plates to be as 21 to 18½, respectively, with the width narrower in the one case than in the other. He also believed that one explanation of the difference between British and American gray irons was the pronounced difference in the operation of blast furnaces in the two companies, the British operating much more slowly and on smaller charges, but particularly under lower blast pressure and temperature. The discussion which followed the presentation of these three papers was animated and interesting.

R. F. Harrington, Hunts Spiller Mfg. Co., Boston, testified that his company had set aside at one time all bars having a tensile strength of more than 40,000 lb. per sq. in. and that an examination of these irons under the microscope had shown a network of phosphide eutectic corroborating Mr. Cook's contention.

Dr. Moldenke stated that the size of the charges in American practice as well as the use of borings and scrap in blast furnaces might have some effect upon the quality of the iron. He then read a written discussion of Mr. Cook's paper, an abstract of which follows:

The criticism against American castings contained in Mr. Cook's highly interesting paper is unquestionably merited, but the conclusions are unfortunately based in greater part on iron made here during the war. Those days are still a nightmare to our foundrymen, who had to use inferior pig irons and melt with coke made from the sweepings of the coal mines. One has but to compare the present-day sulphur content in our scrap with that before the war to understand what has happened. Our general practice undoubtedly is to make softer and weaker castings than our British cousins. The reason is not hard to find. Europe makes castings to last. America makes them to machine easy. Europe does not pay machinists American wages. America does not want a machine to outlast its usefulness particularly. We do not point with pride to a lathe or planer of fanciful design.

That British furnaces run slower, and hence give better—and, as I claim, less oxidized—pig iron than American furnaces, is undoubtedly true, for British irons would otherwise not have had as high a reputation in Germany as they enjoy. However, we still have furnaces which make fine iron, and produce lines of castings equal to any in the world. Americans are prone to publish their failures freely, in the belief that this stimulates discussion leading to overcoming the difficulties, and opening avenues for invention and advancement.

When it comes to a discussion of mechanical testing, I am somewhat puzzled at the summary of British practice, as presented by Mr. Cook. With us here, the Keep method is considered so antiquated that it may only be found sporadically in stove shops as yet. With all due respect to Mr. Keep's attainments, none the less his usefulness as a guide

ended when he refused to adjust himself to the for him uncomfortable facts brought out by foundry metallurgy. Possibly it is this study of cast iron in the light of the engineer, rather than as engineer and metallurgist, that makes me wish Mr. Cook had explained why Britain still uses square and flat bars, cast horizontally, rather than round ones cast vertically. You have only to do as I have done—slice the flat bar into three, longitudinally, and test each unit, to see how different the metal at the corners and edges is from that in the middle.

As to the tensile test, it seems that the engineer—used to working with the elastic limit of materials—needs must have his values in tensile strength figures to understand them, even if he has to convert these figures later to transverse strengths. The foundryman, on the other hand, knows that cast iron is rarely used under a direct pull, but has to stand bending application. Hence he naturally gravitates to the transverse test. Yet this is really a tensile test of the outer fibres of his bar. Our machines are now reliable and are arranged for a cast iron test piece with proper threaded ends as called for by the now universally used arbitration bar of the American Society for Testing Materials, and the American Foundrymen's Association, jointly. Formerly a bar of cast iron was simply inserted in the "V" grips of the machine, and the results almost always came out low.

The question of a proper "International Test Bar" is now being studied here carefully, and it is to be hoped that early conferences may take place looking toward interchange of facts and thoughts between Britain and ourselves, this to extend to the other European nations as rapidly as they may be willing to cooperate.

Mr. Cook is unquestionably right in holding that we have overrated the bad effects of sulphur. Possibly this is so for just the reason of our weak castings as against their strong ones. Mr. Cook's remark that even over there the furnaces are beginning to force production, and thereby lowering the quality of their product, leads me to think that possibly some day the foundryman will force the production of better iron by paying for it, and eventually the sheep will be effectually separated from the goats in furnacedom, so far as the foundry is concerned.

The discussion of Mr. Cook's paper by George K. Elliott will be published in *THE IRON AGE*, June 22.

Part of the discussion of these papers was devoted to the consideration of the standardization of the method of testing cast iron and a discussion of the various methods which are used, participated in by Mr. Cook, Dr. Moldenke and others. There was a difference of opinion as to the relative merits of the square and the round test bars, the British point of view favoring the former.

Marcel Remy in a speech in French, interpreted by Monsieur Gailly, discussed the Belgium viewpoint and said that his associations do not favor tensile tests, although willing to co-operate, and mentioned particularly the Fremont test of shearing as possibly giving more accurate results.

Walter Wood, R. D. Wood & Co., Philadelphia, read a brief discussion touching on the international phase of the question of methods of testing and gave a brief history of the international movement to standardize such tests as far as it had progressed up to the outbreak of the war. He advocated the pushing forward from now on of some international agreement on this matter. The result of this discussion was the adoption of a resolution as follows:

Resolved: That the American Foundrymen's Association will welcome the resumption of deliberation looking toward international agreement upon methods of foundry procedure and specification.

That the A. F. A. deems an early agreement on an international test bar, and the purchase and use of pig iron by its analysis only, essential in the interest of international export trade. The A. F. A. is prepared to cooperate with the foundrymen's and engineering societies of the countries to that end.

Mr. Cook discussed the question of the size and shape of bars and agreed that there should be some understanding on this question. He related that the British are seriously working on the adoption of a general bar which could be used as a common language for all countries in such tests and expressed his inclination to the use of a round bar. So far as the objection to Keep's test is concerned, he said he was aware of these, but felt that there was a great advantage in them from the ability to satisfactorily diagnose the results.

One other paper on this program, entitled "Destruc-

tion and Reconstruction of French Foundries," a memoir submitted by the Association Technique de Fonderie de France, also an international exchange paper, was presented by Raymond Gailly, who read an abstract, illustrated by lantern slides.

Another paper, also an international exchange contribution, entitled "Making Typewriter Frames in a

Belgium Foundry," by James Leonard, president Association Technique de Fonderie de Liege, Herstal, Belgium, was presented by title. The paper, "The European Versus American Molding Machine Practice," by E. Ronceray, president Société Anonyme des Etablissements, Ph. Bonvillain et E. Ronceray, Paris, was read by title only.

Technical Session on Gray Iron and General Matters

THE general and gray iron session, with G. H. Clamer, Ajax Metal Co., Philadelphia, chairman, was well attended and the papers and committee reports for the most part actively discussed. This session was in a measure a continuation of the international session devoted also to gray iron.

An earnest plea for the training of apprentices was made by Dean C. B. Connelly, Pennsylvania Department of Labor and Industry, Harrisburg, Pa., and chairman of the association's committee on industrial education. The report of the committee on the training of apprentices was not read, but will be printed and distributed later. "Unless the foundrymen in this country reach the point where they are training apprentices," said Dean Connelly, "we are not going to get anywhere. The personnel of the American Foundrymen's Association is scientific, research is making the foundry business what it is, and we have advanced remarkably in 10 years. But we need apprentices now more than ever before, and the question of apprenticeship training is a very vital issue at this time," he emphasized. He further said that there was an appalling lack of interest in the question, and urged members of the association to push the idea of educating apprentices. Emphatic appreciation of the importance of the matter was indicated in the discussion, into which several members entered enthusiastically. Attracting the "white collar" young man, the high school boy and the boy with brains into the foundry was expressed by many as entirely feasible, especially as the compensation would be commensurate with the work, and greater than in many "white collar" jobs.

Overcoming Moisture on Metal Patterns

Another subject at this session which elicited a great deal of discussion was that of the best method of overcoming the collection of moisture on metal patterns. In this connection a paper was read by C. A. Cremer, Westinghouse Electric & Mfg. Co., Pittsburgh, on the heating of metal patterns electrically. Mr. Cremer pointed out the objections to parting sand used for this purpose, taking up also the heating of the patterns by gas flame or kerosene torch and the disadvantages inherent in these methods. Early experiments with electric heat were outlined and details as to present application of 15 such heaters in a foundry making radiator castings were given. The electric units were said to have numerous advantages over the gas and oil heaters and the cost is claimed to be favorable in comparison with other methods. Simplicity, convenience and cleanliness were advanced as three important characteristics of the electric heaters.

Asked whether the electrical unit was equally good for all metals, Mr. Cremer said that it was, but particularly for brass, the application outlined in the paper being for iron and steel patterns. Another question brought out that the device mentioned had been in service two years. No data were available as to how often the mica had to be replaced, although on vibrator machines deterioration of this kind would perhaps take place.

From their experience the use of bayberry wax and benzine, which lasts a day, was claimed by several to be adequate for preventing moisture on patterns for fine and close work, some of the foundrymen indicating strong preference for it. Some claimed no permanent success with heating, another stating that he had two of them of his own design going constantly, used also on vibrator machines, but that they had little success with ones which they had bought.

Core Oven Performance and Design

"When core or mold drying ovens are discussed," said C. F. Mayer, Ohio Body & Blower Co., Cleveland,

in reading a paper on "Investigations Relative to Insulated Core Oven Design and Performance," "the question arises as to what type of oven will meet certain conditions most satisfactorily and most economically. Considerable study and first hand observations are essential," he said, "the results of which are valuable only as they represent fundamental principles rather than a host of data."

The material presented by Mr. Mayer was based on an investigation covering a period of more than a year, study being made of two electric ovens of different manufacture and one oil-fuel oven, all under actual working conditions. The ovens had varying wall thicknesses. A radiation-loss test was carried out by investigating the heat losses of insulated boxes of various materials. The effects of minimum and greater than minimum ventilation were taken up and illustrated.

The greatest source of heat was attributed to "radiation" although it is shown that this loss is really an aggregate of innumerable indeterminate heat dissipations, including such sources of loss as caused by lack of air tightness, loss through metal racks and plates, losses at the doors, uninsulated floors, etc.

The extensive bearing on the oven fuel bill of the weight of a core rack or truck, together with the plates and driers, was a factor especially emphasized. The tests show that from 25 to 40 per cent of the total heat used for the baking was absorbed by this means of conveyance, the amount depending directly upon the type of oven used and the material baked. In view of this, it was pointed out, the conveyance used should be as light as possible, and yet of sufficient strength to resist warping and handling stresses. The waste of putting small cores in large ovens and the mixing of large and small cores was outlined by Mr. Mayer.

The paper itself has several illustrations, layouts of the ovens and numerous charts. Owing to the pressure of time there was no discussion of this paper.

Cost Plan Developed for Average Foundryman

A matter taken up in the early part of the session was the report of the committee on foundry costs, which was read by J. Roy Tanner, Pittsburgh Valve, Foundry & Construction Co., Pittsburgh, chairman of the committee. It was pointed out that, in the years since the association first began to urge upon its members the importance of cost determination, there have been prepared a number of plans for this purpose. For various reasons none of these has been generally adopted and there still remains the task of devising some method that will appeal to the average foundryman and especially to those so situated as to not require accounting help of a high order.

What is needed, it was explained, is a plan fully developed which the head of a company can turn over to his existing office force and receive from them at intervals, data which will guide him in management and selling. That has been the aim, it was stated, in compiling the report and its accompanying forms. It was developed with special attention to the gray iron foundry and its problems and flexibility has been one of the principal aims, so that it can be condensed by the smaller foundries and expanded by the larger, to cover any needs.

The forms given comprise a suggested account classification, a form summarizing building depreciation and one for depreciation of mechanical equipment and also a form in which under the title of "rent

charges" are compiled and distributed to departments all expenses chargeable to the plant, property and buildings. Other forms provide for the compilation and distribution to departments of the expenses of administration and general overhead, and also cost of power. Several forms are given for compiling the data to be used in estimating and cost recording and there is also a suggested estimating sheet for use in quoting prices.

The cost figures for a hypothetical plant have been worked out in order to show the actual application of the plan. Full explanation is given in connection with the forms, the whole being clear and practical. There was no discussion of this report.

Specifications for Cast Iron

Considerable progress was reported to have been made by the committee on general specifications for cast iron, which has been working jointly with committee A-3, of the American Society for Testing Materials. The report was presented by Dr. Richard Moldenke, chairman. A set of specifications for high-test cast iron has been drawn up, and the existing specifications for foundry pig iron brought up to date. The full text of the specifications is not yet available for action, the vote of the other society not yet being complete. However, the salient features of these documents were given by Dr. Moldenke. Changes in the specifications for foundry pig iron are of minor character, and in wording only. Suggested action, which has not found favor in current practice of buying and selling pig iron has been left out and the standard methods of sampling and analysis of the two societies have been made the basis of decision in cases of dispute.

A new set of specifications covering all classes of iron with high strength, as obtained by additions of steel to cupola mixture, has been drawn up for high-test cast iron. The general form follows the set for gray iron castings except that there is no division into light, medium and heavy work, with different values for each. The arbitration test bar under transverse test must sustain a load of 3800 lb., with 0.12 in. deflection, before breaking. If tensile test is required it should show 28,000 lb. per sq. in. It was recommended that the association authorize the executive board to receive the specifications when finally approved by the joint committee of both associations and, if found satisfactory, recommend them to the foundry industry as tentative until, after at least a year's trial and discussion, they may be made standard. This was acted on favorably.

Shatter Test for Foundry Coke Advised

It was also reported by the committee that the extending use of by-product foundry coke has made it necessary to give special attention to its friability. Committee D-6 of the American Society of Testing Materials has been devoting the past year to work along this line. There will be reported for discussion and eventual standardization a method to insure the delivery of coke to the foundrymen fit to use in his cupola.

The apparatus to be used at the coke plant will be described, and also the method of taking the sample. Samples of 50 lb. are placed in the machine and dropped

four times on a plate from a height of 6 ft. The material finally obtained is then screened to give the percentages of the coke remaining on a 2, 1½, 1, and ½-in. screen, and that passing through the ½-in. screen. From these figures standard requirements will eventually be drawn up.

Corrosion of Cast Iron

A paper entitled "Memorial on Corrosion of Cast Iron," read by H. Y. Carson, American Cast Iron Pipe Co., Birmingham, Ala., was received with interest. In the discussion F. A. Hall, American Radiator Co., Buffalo, said that his company had been conducting tests on corrosion for several years and gave interesting data on the results of these tests. A definite recommendation was made that the study of the corrosion of cast iron be taken up by the association and it was moved that the aims and purposes of Mr. Carson's memorial be approved and referred to the association's executive board for suitable action. The board is to appoint a committee which will co-operate with other societies having committees on corrosion. It was pointed out by Mr. Clamer, chairman of the session, that the corrosion of non-ferrous alloys was a serious matter also, and a motion to put non-ferrous men on the committee also was carried.

Schools Contribute to Foundry Industry

The status of foundry courses in American technical schools based on questionnaires sent to 71 schools was set forth in a paper on technical school foundries by Profs. J. D. Hoffman and R. E. Wendt, Purdue University. Tables were given to show the number of students in foundry courses, total time spent in foundry work, data on the kind of castings made, equipment available, and other details.

Weight of Iron Castings

The absence of the author or representative resulted, in three cases, in the paper being read by title only. One of these was an instructive study of the weight of iron castings, by John D. Wise, foundry laboratory, University of Illinois, formerly with the Osborn Mfg. Co., Cleveland. In this paper it is pointed out that castings made from the same pattern under identical conditions have surprising variations in weight. Excess of weight concerns the users of castings, the machine shop and the foundrymen, the effect on each being outlined fully. In each of the 10 steps in making a casting there is a chance for the foundryman to decrease the size and weight of the finished piece. These steps are: Deciding allowance for finish, method of molding and amount of draft, making the pattern, ramming the mold, rapping and drawing the pattern, slicking and patching the mold, and closing and pouring. These steps as they affect overweight are taken up in detail. It is stated by the author that on 42 machinery castings investigated it was found that 10.8 per cent could be saved.

Another paper read by title was that of Arnold Lenz, Saginaw Products Co., Saginaw, Mich., on "Flask Equipment for Molding Machines." "The Design of Geared Ladles" was the title of a paper prepared by A. W. Gregg, Whiting Corporation, Chicago.

Technical Sessions on Steel Foundry Subjects

TWO sessions were devoted to steel foundries subjects. One was held Tuesday afternoon, June 6, and the other Wednesday morning, June 7. Of the 13 papers and reports scheduled for the two meetings, all were presented or read by title except two. The chairman of the first session was C. S. Koch, president Fort Pitt Steel Casting Co., Pittsburgh, and that of the second meeting was A. H. Jameson, Bayonne Steel Casting Co., Bayonne, N. J. While the attendance at these sessions was not as large as at some of the others, the interest was of a high order.

Open-Hearth Progress

One of the feature papers of the sessions was entitled "Progress in the Open-Hearth Process," by Willis McKee, Arthur G. McKee & Co., Cleveland. The paper, illustrated by slides, treats largely of the latest developments in the use of the Egler furnace at the Brier

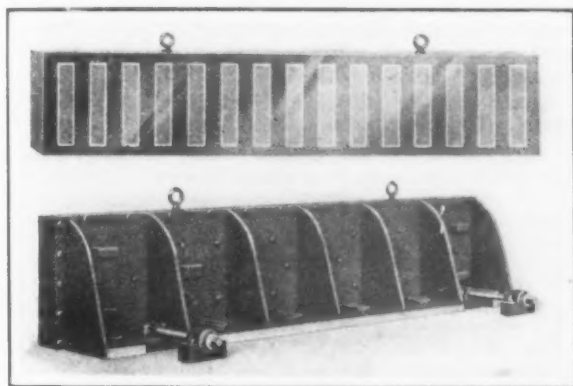
Hill Steel Co.'s plant. A brief abstract of the paper will be printed in a later issue of THE IRON AGE. The author, however, refers to the fact that for many years the time of making heat has remained about the same with very little increase in fuel economy.

(Continued on page 1707)

Horizontal and Vertical Magnetic Chucks

A standard line of magnetic chucks, designed primarily for horizontal use on grinding machines of the Diamond Machine Co., Providence, and the Norton Co., Worcester, but equally well adapted for use on any make of grinding machine of similar capacity, as well as on metal planers and milling machines, is being marketed by O. S. Walker & Co., Inc., Worcester. The component members of the chuck are shown in the accompanying illustration and the vertical face type in the separate illustration.

The chucks are of the rectangular type, and combinations to meet nearly all requirements are now possible through standardization. They are plain in style, those 4 in. in height having working surfaces ranging from 13 $\frac{3}{4}$ x 24 in. to 13 $\frac{3}{4}$ x 72 in., magnetic surfaces ranging from 11 $\frac{3}{8}$ x 22 in. to 11 $\frac{3}{4}$ x 69 $\frac{1}{2}$ in., and base dimensions ranging from 12 x 23 $\frac{3}{4}$ in. to 12 x 71 $\frac{1}{2}$ in. The weights vary from 290 to 810 lb. net. Those having a height of 4 $\frac{1}{2}$ in. are built with working surfaces ranging from 16 $\frac{3}{4}$ x 24 in. to 16 $\frac{3}{4}$ x 72 in., magnetic surfaces from 14 x 22 in. to 14 x 69 $\frac{1}{2}$ in., with 15 x 23 $\frac{3}{4}$ in. to 15 x 71 $\frac{1}{2}$ in. base dimensions. The net weight of these chucks is from 415 to 1150 lb., according to size. Watts used by the smaller chucks range from 140 to 420 and by the larger, from 175 to 520.



The interior walls of the chuck body are arranged to give suitable support for the top plate, and at the same time provide a path for the magnetic flux about each coil, thereby producing maximum efficiency. Every precaution has been taken by the company to make the chucks waterproof. Piping is substituted for the usual rubber hose connection to the terminal box, an arrangement intended to provide maximum service and minimum maintenance expense.

The company has also placed on the market the 18 x 88-in. vertical face chuck, shown in the separate illustration. It is designed without or with adjusting screws, the latter equipment providing a convenient means for moving the chuck, especially when only slight adjustments are desired. The same system of coils as in regular horizontal chucks is employed, thus retaining, it is said, the same flexibility in arrangement of the poles to hold the work effectively. Since there are no clamps and bolts to manipulate, as is the case with mechanical fixtures, the time required for loading and unloading is reduced to a minimum.

In the operation of the vertical chuck, residual magnetism in the face is the most important factor. No clamps being employed, the work would fall away from the chuck immediately upon the breaking of the electric circuit through the chuck coils, were it not for the magnetism remaining in the chuck face. This residual magnetism is sufficient to hold the work in place on the chuck, but it does not interfere with the easy removal of the work. After removing the work the chuck is demagnetized in the usual manner, thereby facilitating

the cleaning of the chuck face in preparation for the next load. Residual magnetism control or demagnetizing switch is provided in this design.

Secretary Hoover Addresses Ohio Manufacturers

Secretary of Commerce Herbert Hoover pleaded for individual initiative and incentive in business, pointing to Russia as a frightful example of applied Socialism, in addressing a sectional meeting June 7 at Youngstown, of the Ohio Manufacturers' Association. The United States is on the way back to sound, stable prosperity and the danger of financial disaster is past, he said.



The Vertical Face Chuck, Front and Rear Views, Is Shown at the Left. Details of the rectangular magnetic chuck are shown above

"Capital has begun to accumulate; the year 1921 was one of liquidation; 1922 is one of recuperation," he stated. "Productivity of the American people will soon be nearly normal." It is necessary that the Government be gotten out of business, he argued, if business is to resume its full share of prosperity. Mr. Hoover presented figures to substantiate his contention that the Government must be reorganized along business lines.

"Our economic wounds cannot be cured by any patent remedies or miracle methods. The reconstruction must be cell by cell. It will require time. Business men and workers will together eventually effect the cure." James A. Emery, general counsel of the National Manufacturers' Association, supplemented Mr. Hoover's remarks.

Previous to his address, Secretary Hoover visited the plants at East Youngstown of the Youngstown Sheet & Tube Co., in company with Charles S. Robinson, vice-president and general manager.

Manufacturers from all sections of northern Ohio attended the conference. James A. Campbell, president of the Sheet & Tube company, presided over the dinner in the evening, in absence of J. H. Frantz of Columbus, president of the association.

At a business session in the morning, Malcolm Jennings of Columbus, executive secretary, warned manufacturers to guard against a tendency to increase both local and state taxes, characterizing the present taxation system as a constant drain on business and industrial resources.

The constitutionality of the law that prohibits strike-bound firms from advertising for help unless they warn applicants that labor trouble exists was upheld by a decision of the Wisconsin Supreme Court last week. The case was brought by the Biersach & Neidermeyer Co., Milwaukee, which was fined \$25 in the district court at Milwaukee.

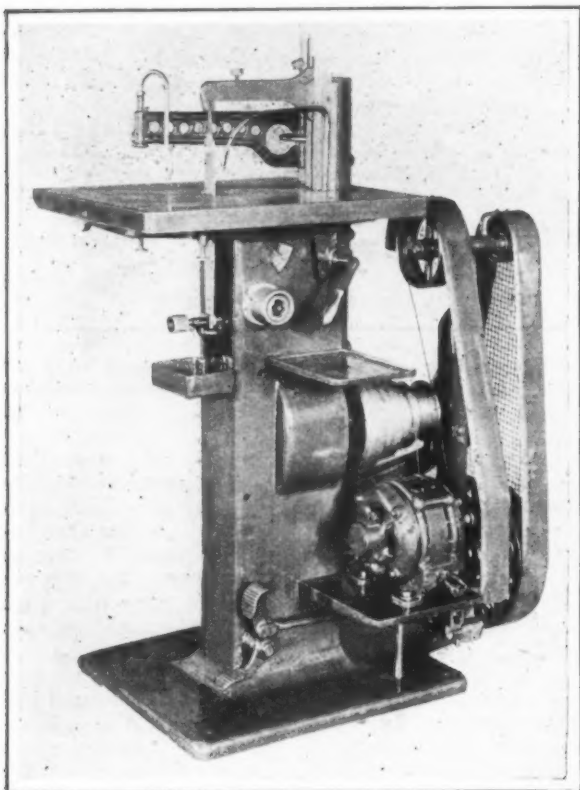
The Canonsburg Steel & Iron Works, Canonsburg, Pa., has placed a contract with the Aetna Foundry & Machine Co., Warren, Ohio, for sheet galvanizing machinery and pickling tanks.

New High-Power Filing Machine

The high-power filing machine shown in the accompanying illustration has been brought out by the Oliver Machinery Co., Grand Rapids, Mich., and is designed to take files from 3 in., needle, to 14 in., bastard. Work up to 9 in. high may be filed, although for constant filing work up to 6 in. is recommended as the maximum. The distance from the front side of the file is 9 in.

The table is 20 by 24 in. and is arranged to tilt for draft or clearance in four directions. Diagonal grooves are provided in the table to let the filings out of the way of the work and a self contained pump with swinging nozzle blows the filings from the point of contact with the file. A removable box for catching the filings is provided. The tool shelf is located as shown.

The stroke is adjustable by an eccentric inside of the column, the adjustment being accessible and easily made. The eccentric is connected to the vertical slid-



High-Power Filing Machine. A cam arrangement inside of the cone pulley, releasing the file on the upstroke, is a feature

ing mechanism by a telescoping connecting-rod which permits use of various length of files. The cone pulley is direct connected to the eccentric shaft and moving parts are balanced by a counterweight. A clamp arm, which swings over the table, is provided to hold the work down to the table.

The head has a patented arrangement with a cam inside of the cone pulley, releasing the file on the up stroke, 1/32 in. This arrangement is intended to lengthen the life of the file and to be useful in giving a uniform degree of clearance on all sides of dies and similar work. The slide is 18 in. long and of machinery steel with the lower arm of cast steel, welded to it. Provision is made for adjusting the lower arm to line up files, whether straight or tapered. The slide is driven by the four-step cone pulley which gives four speeds from 80 to 320 strokes per min. The lengths of stroke are adjustable from 1/2 to 7 in.

A 1/2 hp. 1800 r.p.m. motor is employed and is mounted as shown. It is belted to a speed-reducing jackshaft having yoke support, thus making the outfit self contained. The floor space occupied is approximately 23 by 38 in. and the weight of the machine 700 lb. Overhead-support arm for filing closed bottom dies or similar work can be provided extra and also a lower support clamp for filing close-top dies. A toting truck

to make the machine portable can be furnished as also a sawing attachment consisting of upper and lower arms for holding hack saws.

New Forging Company Incorporated

The Stanton Forging Co., Inc., has been organized under the laws of the State of New Jersey to carry on a general steel forging business in Camden, N. J. The company will occupy the plant of the firm of Stanton & Lewis, which was established about 30 years ago and has specialized in ring and cylinder forgings. It will now be dissolved.

The president of the Stanton Forging Co. is Hugh A. McDonnell, who for some years has been connected with Stanton & Lewis. J. P. Stanton will be secretary, and Henry D. Rutter, treasurer. Mr. Rutter, who will be active in the conduct of the sales department of the new company, has for six years been secretary and general manager of sales of the Cann & Saul Steel Co., Philadelphia and Royersford, Pa. Previous to being with Cann & Saul, Mr. Rutter was for 12 years with the Pennsylvania Forge Co., Bridesburg, Pa.

The new company is equipped to supply forgings of every description, both large and small, and has facilities for machining, if that is required. The company will carry a line of machinery and alloy-steel bars, tool steel and forged-steel pipe flanges. Its plant is located at German and Everett streets, Camden, N. J.

Copper and Brass Prize Contest

As a part of a nation-wide campaign designed to foster the use of more permanent materials in building, the Copper and Brass Research Association has announced a contest offering cash prizes for the best photographs showing the relative durability of materials which go into the construction of American homes. The association makes this statement:

Some idea of the cost to this country of the practice of building for speculative profit rather than for use is evidenced by the result of a statistical study just completed by the Copper and Brass Association. The fire loss on the 21,000,000 American homes, insured as they are for a total of \$91,700,000,000, is about \$35,000,000 a year, based on figures for 1918 to 1920, inclusive. The rust bill, covering the renewal of sheet metal work, principally leaders and gutters, plumbing pipe, hardware, etc., is annually 20 times that sum.

The effort to show the public the wastefulness of the use of materials which need early and frequent replacement is a part of the present intensive campaign of the copper and brass companies of the country to increase the use of those metals in domestic consumption. The photographic contest is a part of that campaign.

Fourteen prizes ranging from \$150 to \$10 will be awarded for photographs of copper and brass objects of utility or ornamentation which to qualify must have been in use more than 35 years. Included are copper roofs, brass door knockers, old copper cooking utensils, brass plumbing pipe. Fourteen additional prizes of similar amounts are offered for the best photographs showing the results of using substitutes for copper and brass.

Youngstown Shippers Protest

Suspension of new freight rates, scheduled to become effective June 15, on iron and steel products from the Youngstown, Chicago, St. Louis and Birmingham districts to points in Texas, Oklahoma and Arkansas is asked by the traffic bureau of the Youngstown, Ohio, Chamber of Commerce. Youngstown shippers claim that the new rates are discriminatory.

Freight charges on all business emanating in the Valleys and destined to Bristol, Va., and Johnson City, Tenn., two important Southern railroad basing points, have been placed on the same basis as rates from Cleveland, Pittsburgh, Buffalo and other steel producing centers. Youngstown shippers have heretofore paid a combination of rates.

The Canonsburg Iron & Steel Works, Canonsburg, Pa., has placed an order with Aetna Foundry & Machine Co., Warren, Ohio, for complete galvanizing equipment and pickling vats.

Vise Tool for Making Screws and Springs

A device for use in conjunction with a vise as illustrated, and known as the Ramsdell's hand vise lathe has been placed on the market by the Campbell Mfg. Co., Worcester, Mass. It is designed to produce from bar stock up to 1 in. in diameter the following screws and studs: milled studs, set screws, hexagon cap screws up to and including $\frac{5}{8}$ in. square, fillister and round head cap screws up to and including $\frac{3}{4}$ in., flat-head cap screws up to and including $\frac{9}{16}$ in., button head up to and including $\frac{5}{8}$ in., pins and other special screws and studs of any desired length, such as used in automotive and other machinery. The tool is most useful perhaps in garage and machinery repair work. It may be used also to wind wire springs of any desired pitch.

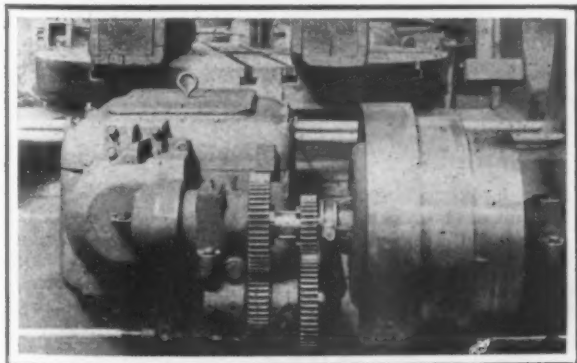
A separate illustration shows the tool knocked down and packed in a box with necessary taps, dies, bushings, cutting tools, spacers, etc. Centering bushings from $\frac{1}{4}$ in. up to and including 1 in. by sixteenths of an inch, are included in each set, both standard and S. A. E. dies and taps being also part of the equipment. The combined die and tool holder is constructed so that the required die may be fitted into the upper part and a centering bushing of the correct size in the lower. The distance between the center of the die and the center of the centering bushing is $\frac{9}{16}$ in., giving a long bearing for stock to be threaded. The stock to be threaded passes through the centering bushing before engaging the die which prevents cutting the thread off center. This bushing also obviates milling of studs and screws off center.

The feeding device is hand operated. All wearing parts are machined to close dimensions and are case hardened. Any combination of dies, taps and bushings not included in regular sets can be supplied.

Slow-Speed Device for Boring Mill

A slow-speed device as shown in the illustration, for the 7-ft. boring mill, has been brought out by the Cincinnati Planer Co., Cincinnati.

The mill was arranged for about 30 per cent greater speed than standard for machining locomotive driving boxes and other brass work. To permit of turning tires on the same machine, which would require much slower



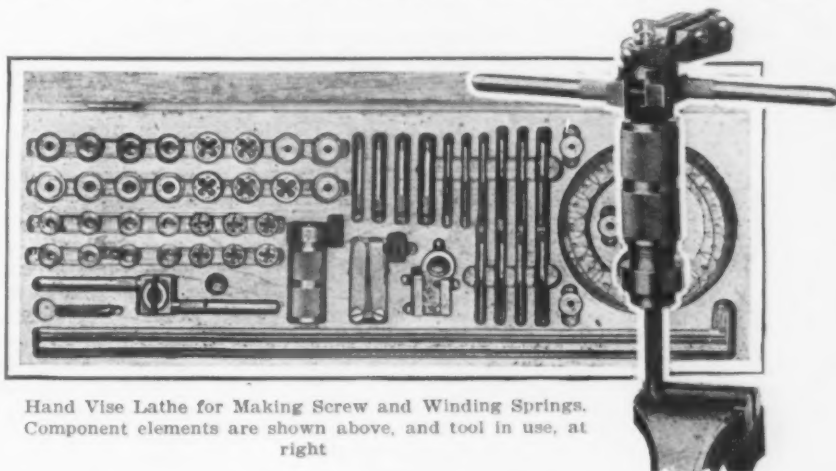
Slow Speed Device for Boring Mill. Gears as shown are in position for low speed

speed, the special gearing shown was devised. The arrangement is, in short, intended to provide unusually low speed without detracting from the use of the mill on standard or high-speed work.

The gears in place as shown operate the low speed and by sliding the small upper gear into the clutch of the larger gear gives the direct drive for the regular boring mill speeds. A special cover protects the gearing and carries the shifter lever.

To Co-operate with Bureau of Standards

WASHINGTON, June 13.—Desiring to keep in close touch with the iron and steel industry so that the investigations carried out by the Bureau of Standards will be along lines best meeting the needs of information for improvement of knowledge of the bureau of the fundamental properties of iron and steel, there has been formed a committee advisory to the bureau on ferrous metals made up of representatives of the scientific and technical associations interested in iron and steel. The following societies were represented at a meeting held June 2: American Institute of Mining and Metallurgical Engineers, American Society for Testing Materials, American Association of Steel Manu-



Hand Vise Lathe for Making Screw and Winding Springs. Component elements are shown above, and tool in use, at right

facturers, American Society for Steel Treating and Society of Automotive Engineers. It is expected that there will also be added the American Foundrymen's Association, the mechanical division of the American Railroad Association and the Electromechanical Society.

Will Test Labor Efficiency

WASHINGTON, D. C., June 13.—Tests are to be applied to workmen under the direction of the National Committee on Labor Efficiency and Production in order to determine their efficiency in production in various industries. The work of the committee, headed by Ethelbert Stewart, United States Commissioner of Labor Statistics, Department of Labor, is concerned with the preparing of production schedules at present. Other members of the committee consist of expert advisers who have been selected because of their knowledge of the subject. They include: George E. MacIlwain, Wellesley Hills, Mass., secretary; Charles T. Allen, Birmingham, Ala.; Sanford E. Thompson, Boston; John F. Coleman, New Orleans; Paul H. Norcross, Atlanta, Ga.; Theodore F. Laist, Chicago.

The first industry to be taken up will be the building industry. It also has been decided to take up an investigation of the textile industry currently with the investigation in the building trades. It is also proposed to include the iron and steel industry in the next general survey to be made. The Bureau of Labor Statistics already has some information regarding the efficiency of workers in this industry.

Another record-breaking month of construction is reported by the F. W. Dodge Co. All previous records were broken in April; May building contracts passed the April total with a margin of 3 per cent. Residential building contracts broke all previous records in May, amounting to \$140,932,000, or 39 per cent of the month's total. Other important items in the May total were: 18 per cent for public works and utilities, 16 per cent for business buildings, 9 per cent for educational buildings, and 7 per cent for industrial plants.

The Bristol Brass Co., Bristol, Conn., is operating on full schedule, and is gradually increasing its working forces.

Definite System of Designing Bevel Gears*

Use of Low Pressure Angle the Basis of Gleason System— Practical and Theoretical Factors Outlined— System Formulated in Simple Tables

FOR a long time need has been felt for a definite system of designing bevel gear teeth which would give the most desirable tooth form for use under average conditions. It has been common practice in figuring bevels to use spur gear formulas, such as those of Brown & Sharpe. These formulas were worked out for an interchangeable spur gear system, which necessarily required some compromise, so that when applied

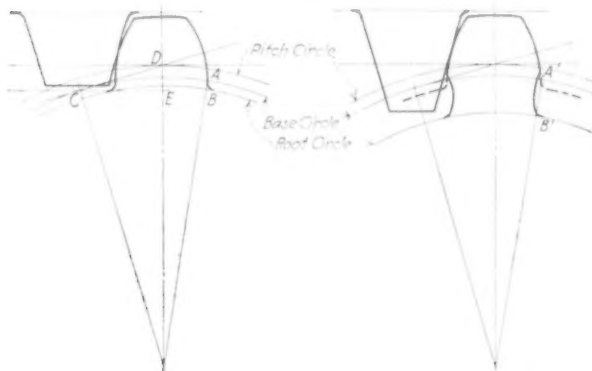


Fig. 1. Involute in Mesh with Rack Fig. 2. Rack Tooth Extended Below Point C

to bevel gears, where interchangeability is not a factor, the possibilities of the involute curve are not fully utilized. The Gleason 0.3 and 0.7 long and short addendum tooth was brought out to improve this condition, and various other alterations of the standard spur gear design have been used, but for the most part these can be applied to certain combinations only and, therefore, are not universal. Recent applications of bevel gearing covering a wide range of ratios have made it imperative that a progressive system embracing all ratios and any number of teeth in common use be worked out.

An investigation has been conducted by the Gleason Works with the idea of developing a practical system

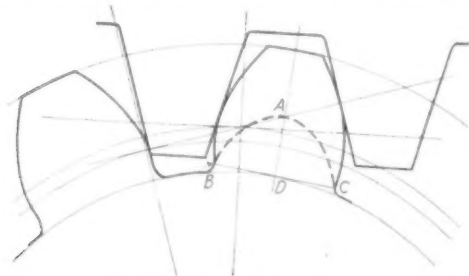


Fig. 3. 10T-47T Spiral Bevel Ratio, 14 1/2-Deg. Pressure Angle

of designing the quietest form of tooth consistent with strength and wear considerations. The results of this research have been incorporated in a simple table. This system applies to any pair of generated spiral or straight tooth bevel gears operating at right angles where the pinion is the driver and has 10 or more teeth. Bevel gears cut on former-type planers are the subject of a special study, as certain practical limitations prevent the application of the system to this class of gearing without modification.

Lowest Pressure Angle Basis of System

The principal qualities considered in arriving at this system, arranged in the order of their importance,

*From a paper by F. E. McMullen and T. M. Durken, Gleason Works, Rochester, N. Y., read at the annual meeting of the American Gear Manufacturers Association, Buffalo, April 21.

are quietness, strength and durability. As to quietness, experience shows that bevel gears cut with a lower pressure angle will operate more quietly than those with a higher one, other conditions being equal. Several reasons account for this: With the lower pressure angle a greater arc of action is obtained, any eccentricity has less effect, and the radial component of the tooth load is minimized. Thrust forces also make it desirable to avoid the higher angle, not only because of the introduction of an axial or cone thrust not present in spurs, but also because the majority of bevel gears are overhung from their supports so that the total load should be kept as low as possible. For these reasons the basis of the system is the use of the lowest pressure angle which will not sacrifice strength by introducing excessive undercut.

It might be well to describe at this point what is meant by undercut. Fig. 1 shows an involute tooth in mesh with a rack. The tooth profile consists of two parts: (1) the involute curve which has its origin at A and continues to the top of the tooth, and (2) the fillet AB lying between the base and root circles. If the rack, which represents the generating tool, does not project below the point C, beyond which involute action cannot take place, the fillet AB will always lie outside of a radial line OA drawn from the origin of the involute.

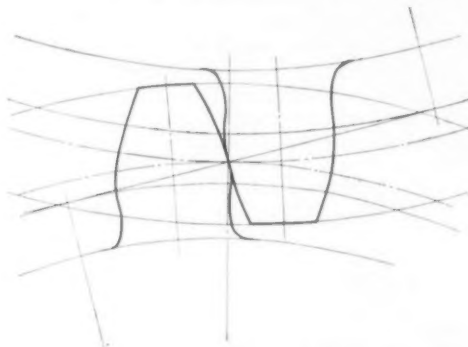


Fig. 4. 14T-16T Straight Bevel Ratio, 14 1/2-Deg. Pressure Angle

lute. When the rack tooth is made longer so that it extends below point C, the condition shown in an exaggerated form in Fig. 2 is realized. In this diagram the fillet A'B' is seen to come inside of a radial line O'A' and also to cut away part of the involute curve slightly.

Examination of Fig. 1 shows that the value for dimension DE, which is the distance from C to the pitch line, is equal to the back cone radius $DO \times \sin^2$ pressure angle, so that we might make a definition of undercut by stating that a generated bevel gear tooth is said to be undercut when the dedendum is greater than the back cone radius $\times \sin^2$ pressure angle. However, it can be shown mathematically that it is possible to exceed this value considerably before there is any appreciable undercut. In fact, for the ordinary automobile rear axle pinion having anywhere from 10 to 13 teeth, the dedendum is nearly always more than this critical value, sometimes being as much as 100 per cent greater.

Limit of Undercut Studied

The point at which to limit undercut in the present system has been determined by a study of successful automobile practice, because that application represents a condition where both silence and strength are paramount. The 10T-47T 14 1/2 deg. spiral bevel ratio shown in Fig. 3 has a pinion dedendum 60 per cent greater than the back cone radius $\times \sin^2$ pressure angle, and

although the undercut is about as great as for any job in the spiral bevel system, it cannot be called excessive. Likewise the 14T-16T $14\frac{1}{2}$ deg. straight bevels seen in Fig. 4 represent as extreme a case of undercut as will be encountered in the straight tooth system, yet they have a tooth profile which is not weakened to any great extent. The same ratio with a $17\frac{1}{2}$ -deg. pressure is shown in Fig. 5, but the strength of the gears

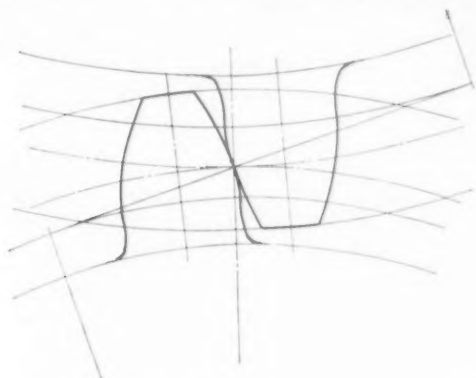


Fig. 5. 14T-16T Straight Bevel Ratio, $17\frac{1}{2}$ -Deg. Pressure Angle

is increased less than 5 per cent., although it has the appearance of being more than this.

The selection of a low pressure angle in preference to a higher one does not result in a considerably weaker tooth, as ordinarily supposed, because the stronger section of the higher pressure angle tooth is offset by the greater arc of action with the lower angle. Reference to Figs. 3 and 6 will make this clear. Fig. 3 shows a 10T-47T ratio drawn with a $14\frac{1}{2}$ -deg. pressure angle, and in Fig. 6 the same ratio is laid out with 20 deg. In each case the pinion tooth at the left is just on the point of engaging so that the tooth at the right is carrying the full load. This will be the worst condition of loading on each tooth. Any further movement to

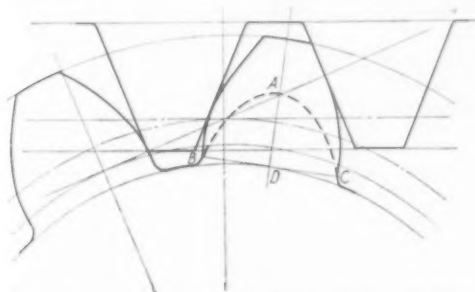


Fig. 6. 10T-47T Spiral Bevel Ratio, 20-Deg. Pressure Angle

the right brings another tooth into contact, with consequent distribution of the load over two teeth, while movement to the left lowers the line of application of the force toward the base of the tooth. In this position the comparative strength of the teeth can be found by passing a parabola through the intersection point A (see Figs. 3 and 6) of the line of action and center line of tooth, and tangent to the tooth profile. The value of $(BC)^2 \div AD$, which is a measure of the strength, can then be obtained. For the 10T-47T ratios shown in Figs. 3 and 6 the 20-deg. gear is about 14 per cent stronger than the $14\frac{1}{2}$ -deg., but the pinions are of equal strength. The 20-deg. ratio, however, is much worse for case hardening on account of the narrow width of top land. A pair of 15T, $14\frac{1}{2}$ -deg. and another pair of 15T, 20-deg. miter gears are shown in Figs. 7 and 8; here the 20-deg. gear is less than 10 per cent stronger than the $14\frac{1}{2}$ -deg.

Questions of Strength and Durability

This method of calculating the strength is similar to the one used in deriving the Lewis formula, except in regard to the point of application of the load. The Lewis formula is based on the assumption that the load is applied at the end of the tooth, but in modern generating gearing this is a condition which practically

never occurs. Professor Marx, in his experiments at Leland Stanford University, found that the force was not at the end of the tooth when failure took place, and also proved that the strength was increased as the arc of action became greater. From these conditions it is evident that the choice of a $14\frac{1}{2}$ -deg instead of a 20-deg. pressure angle is not made at any extreme sacrifice of strength, but that for a large number of designs there is very little difference between the two.

The question of durability viewed from a theoretical standpoint would seem to resolve itself into a problem of obtaining a minimum of sliding and a maximum of rolling motion, as it is natural to assume that the wear would vary directly with the sliding action. But it is well known that the greatest wear often takes place near the pitch point where there is no sliding action. This is because the big factor causing wear is unit pressure and not sliding action. When the point of contact is near the pitch point all the load is borne by one tooth, while it is distributed over two teeth near

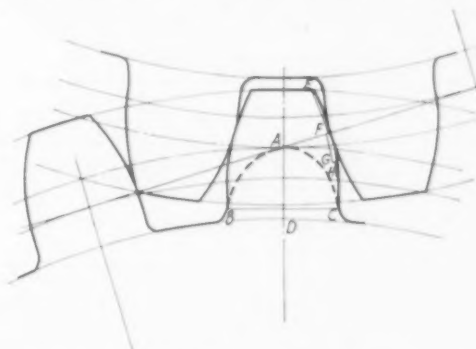


Fig. 7. 15T Spiral Bevel Miter, $14\frac{1}{2}$ -Deg. Pressure Angle

the beginning or end of action with a consequent reduction of unit pressure. In Figs. 7 and 8 the part of the pinion profile which will wear most rapidly is FG, because it has to carry the whole load; EF and GH will not wear as fast, even though the sliding action is higher, on account of the lower unit pressure. For this reason no attempt has been made in this system to maintain any predetermined percentage of rolling action, but rather to balance up between approach and recess the amount of rolling already fixed by the requirements of quietness and strength.

Wherever possible, the action during approach has been favored in order to compensate for the change in direction of the friction component which tends to increase the obliquity of the line of action during approach, and decrease it during recess. Account has also

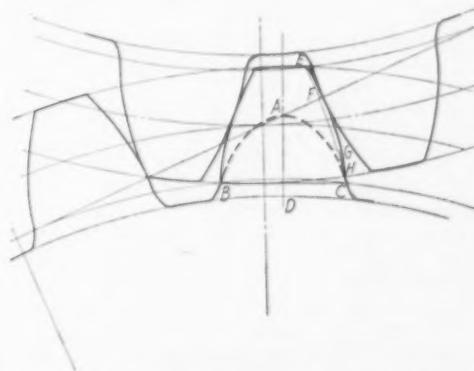


Fig. 8. 15T Spiral Bevel Miter, 20-Deg. Pressure Angle

been taken of the high velocity of sliding action which occurs at the top of long addendum pinion teeth and which, in extreme cases, has led to abrasion. Safe values for this sliding action were obtained from jobs in service and the design regulated so that these were not exceeded.

Arrangement of Factors Making Up System

In establishing the various factors which go to make up the system, the aim was to arrange them in as

Table I—Gleason System for Generated Straight Tooth Bevel Gears*

For straight tooth bevel gears operating at right angles where the pinion is the driver and has 10 or more teeth.
Working Depth: 2.000 in. ÷ D.P. Full Depth: 2.188 in. ÷ D.P.
Pressure Angle:

Ratios having 14 or more teeth in pinion.....	14½ deg.
Ratios having 13-13 to 13-24, 17½ deg. Ratios 13-25 and higher.....	14½ deg.
Ratios 12-12 and higher.....	17½ deg.
Ratios 11-11 to 11-14, 20 deg. Ratios 11-15 and higher	17½ deg.
Ratios 10-10 and higher.....	20 deg.

Addendum:

Of gear = addendum for 1 D.P. (from Table II) ÷ D.P.
Of pinion = 2.000 in. ÷ D.P. — addendum of gear.

Dedendum:

Of gear = 2.188 in. ÷ D.P. — addendum of gear.
Of pinion = 2.188 in. ÷ D.P. — addendum of pinion.

Circular Thickness:

Of gear for all ratios using 14½ deg. = 1.071 in. ÷ D.P. + [0.5 × addendum of gear] — K (from Table II) ÷ D.P.
Of gear for all ratios using 17½ deg. = 0.971 in. ÷ D.P. + [0.6 × addendum of gear] — K (from Table II) ÷ D.P.
Of gear for all ratios using 20 deg. = 0.871 in. ÷ D.P. + [0.7 × addendum of gear] — K (from Table II) ÷ D.P.
Of pinion for 14½, 17½ or 20 deg. = 3.142 in. ÷ D.P. — circular thickness of gear.

*For straight tooth bevel gears only.

simple and practicable a form as possible without sacrificing any of the three principal qualities of quietness, strength and durability. In a non-interchangeable system like the one presented, any of the factors can be

with 14½ deg., an intermediate pressure angle must be called for. The angle of 17½ deg. has been selected because it has already been used to quite an extent by different gear manufacturers. Although at least one pressure angle between 14½ and 20 deg., which are 5½ deg. apart, is required, more are unnecessary because any new angle would not be more than 1½ deg. different from the three selected (14½, 17½ and 20 deg.). This change is too small to have any practical effect.

Working Depth of Tooth

The working depth of tooth, which has been fixed as 2.000 in. ÷ D.P. for straight tooth bevels and 1.700 in. ÷ D.P. for spirals, is the same as has been successfully used for a number of years. For the average spiral angle of about 30 deg., the normal pitch is approximately 85 per cent of the linear, so the normal section of a spiral tooth will be proportioned about the same as a straight tooth. Originally the working depth for both straight and spiral bevels was made equal to 2.000 in. ÷ D.P., but some years ago the depth for spiral bevels was decreased to 85 per cent of this amount because the top of the tooth on the normal was too thin and gave rise to hardening troubles. Stubbing the tooth more than 85 per cent decreased the arc of action and gave a noisier gear. It would be desirable from a standpoint of standardization to use the same working depth for straight tooth bevels as for

Table II—Gleason System for Straight Tooth Bevel Gears*

ADDENDUM FOR 1 D.P.

To obtain addendum select from the table the value corresponding to ratio given by this formula: Ratio = number of teeth in gear ÷ number of teeth in pinion.

Ratios		Add In.	Ratios		Add In.	Ratios		Add In.	Ratios		Add In.
From	To		From	To		From	To		From	To	
1.00	1.00	1.000	1.15	1.17	0.880	1.42	1.45	0.760	2.06	2.16	0.640
1.00	1.02	0.990	1.17	1.19	0.870	1.45	1.48	0.750	2.16	2.27	0.630
1.02	1.03	0.980	1.19	1.21	0.860	1.48	1.52	0.740	2.27	2.41	0.620
1.03	1.04	0.970	1.21	1.23	0.850	1.52	1.56	0.730	2.41	2.58	0.610
1.04	1.05	0.960	1.23	1.25	0.840	1.56	1.60	0.720	2.58	2.78	0.600
1.05	1.06	0.950	1.25	1.27	0.830	1.60	1.65	0.710	2.78	3.05	0.590
1.06	1.08	0.940	1.27	1.29	0.820	1.65	1.70	0.700	3.05	3.41	0.580
1.08	1.09	0.930	1.29	1.31	0.810	1.70	1.76	0.690	3.41	3.94	0.570
1.09	1.11	0.920	1.31	1.33	0.800	1.76	1.82	0.680	3.94	4.82	0.560
1.11	1.12	0.910	1.33	1.36	0.790	1.82	1.89	0.670	4.82	6.81	0.550
1.12	1.14	0.900	1.36	1.39	0.780	1.89	1.97	0.660	6.81	....	0.540
1.14	1.15	0.890	1.39	1.42	0.770	1.97	2.06	0.650	....	....	....

VALUES OF K FOR CIRCULAR THICKNESS FORMULA

Select value corresponding to the number of teeth in the pinion and ratio given by formula above.

No. Teeth in Pinion	A	Values of K for Different Ratios, Inches															
		1.00 to 1.25	1.25 to 1.50	1.50 to 1.75	1.75 to 2.00	2.00 to 2.25	2.25 to 2.50	2.50 to 2.75	2.75 to 3.00	3.00 to 3.25	3.25 to 3.50	3.50 to 3.75	3.75 to 4.00	4.00 to 4.50	4.50 to 5.00	5.00 and higher	
10		0.025	0.070	0.100	0.120	0.140	0.160	0.175	0.190	0.205	0.215	0.225	0.230	0.240	0.250	0.225	
11		0.010	0.015	0.050	0.080	0.105	0.125	0.145	0.160	0.170	0.180	0.190	0.195	0.200	0.210	0.220	
12		0.000	0.040	0.070	0.100	0.120	0.140	0.155	0.170	0.180	0.185	0.190	0.195	0.205	0.210	0.215	
13		0.000	0.015	0.040	0.045	0.050	0.060	0.070	0.080	0.090	0.100	0.110	0.120	0.135	0.150	0.165	
14		0.000	0.015	0.030	0.050	0.065	0.080	0.090	0.100	0.110	0.120	0.125	0.130	0.140	0.150	0.160	
15 to 17		0.000	0.000	0.010	0.020	0.030	0.045	0.060	0.070	0.080	0.090	0.095	0.100	0.110	0.115	0.120	
18 to 21		0.000	0.000	0.000	0.000	0.010	0.030	0.045	0.060	0.070	0.080	0.085	0.090	0.095	0.100	0.100	
22 to 29		0.000	0.000	0.000	0.000	0.010	0.030	0.040	0.050	0.060	0.065	0.070	0.070	0.080	0.085	0.085	
30 and up		0.000	0.000	0.000	0.000	0.010	0.025	0.035	0.040	0.045	0.050	0.055	0.060	0.065	0.070	0.070	

*These values are for straight tooth bevel gears only. A—Ratios.

made to vary for each ratio and number of teeth, but simplicity and the interests of standardization are opposed to expressing these factors as variable quantities where the probable accuracy of the assumptions made in determining them does not warrant it.

An example of this is the pressure angle. In a purely theoretical system it might have any value, while the same practical results are obtained in this system, which includes all ratios having 10 or more teeth in the pinion, with the use of three angles (14½, 17½ and 20 deg.) for straight tooth bevels and one angle, 14½ deg., in all except a few unusual cases, for spiral bevels. The pressure angle to be used for any given pair of gears is specified in Tables I and III, and has been selected as the lowest angle which avoids excessive undercut. The introduction of the pressure angle of 17½ deg., which is not universally used, is considered necessary in order to live up to the stated purpose of developing a practical system which will give the quietest form of tooth consistent with strength and wear. It has been found that there is a decided increase in noise when the pressure angle is changed from 14½ to 20 deg., so that in order not to compromise the system when the undercut becomes too great

spirals. But after considerable experimenting along this line it was found that straight bevels having an 85 per cent stub tooth ran noticeably noisier than

Table III—Gleason System for Generated Spiral Bevel Gears*

For spiral bevel gears operating at right angles where the pinion is the driver and has 10 or more teeth.
Working Depth: 1.700 in. ÷ D.P. Full Depth: 1.888 in. ÷ D.P.

Pressure Angle:

Ratios having 12 or more teeth in pinion.....	14½ deg.
Ratios 11-11 to 11-19, 17½ deg. Ratios 11-20 and higher	14½ deg.
Ratios 10-10 to 10-24, 17½ deg. Ratios 10-25 and higher	14½ deg.

Addendum:

Of gear = addendum for 1 D.P. (from Table IV) ÷ D.P.
Of pinion = 1.700 in. ÷ D.P. — addendum of gear.

Dedendum:

Of gear = 1.888 in. ÷ D.P. — addendum of gear.
Of pinion = 1.888 in. ÷ D.P. — addendum of pinion.

Circular Thickness:

Of gear for all ratios using 14½ deg. = 1.061 in. ÷ D.P. + [0.6 × addendum of gear] — K (from Table IV) ÷ D.P.
Of gear for all ratios using 17½ deg. = 0.976 in. ÷ D.P. + [0.7 × addendum of gear] — K (from Table IV) ÷ D.P.
Of pinion for 14½ or 17½ deg. = 3.142 in. ÷ D.P. — circular thickness of gear.

*For spiral bevel gears only.

Table IV—Gleason System for Spiral Bevel Gears*
ADDENDUM FOR 1 D.P.

To obtain addendum select from the table the value corresponding to ratio given by this formula: Ratio = number of teeth in gear ÷ number of teeth in pinion.

Ratios		Add In.	Ratios		Add In.	Ratios		Add In.	Ratios		Add In.
From	To		From	To		From	To		From	To	
1.00	1.00	0.850	1.15	1.17	0.750	1.41	1.44	0.650	1.99	2.10	0.550
1.00	1.02	0.840	1.17	1.19	0.740	1.44	1.48	0.640	2.10	2.23	0.540
1.02	1.03	0.830	1.19	1.21	0.730	1.48	1.52	0.630	2.23	2.38	0.530
1.03	1.05	0.820	1.21	1.23	0.720	1.52	1.57	0.620	2.38	2.58	0.520
1.05	1.06	0.810	1.23	1.26	0.710	1.57	1.63	0.610	2.58	2.82	0.510
1.06	1.08	0.800	1.26	1.28	0.700	1.63	1.68	0.600	2.82	3.17	0.500
1.08	1.09	0.790	1.28	1.31	0.690	1.68	1.75	0.590	3.17	3.67	0.490
1.09	1.11	0.780	1.31	1.34	0.680	1.75	1.82	0.580	3.67	4.56	0.480
1.11	1.13	0.770	1.34	1.37	0.670	1.82	1.90	0.570	4.56	7.00	0.470
1.13	1.15	0.760	1.37	1.41	0.660	1.90	1.99	0.560	7.00	....	0.460

VALUES OF K FOR CIRCULAR THICKNESS FORMULA

Select value corresponding to the number of teeth in the pinion and ratio given by formula above.

No. Teeth in Pinion		A	Values of K for Different Ratios, Inches														
			1.00 to 1.25	1.25 to 1.50	1.50 to 1.75	1.75 to 2.00	2.00 to 2.25	2.25 to 2.50	2.50 to 2.75	2.75 to 3.00	3.00 to 3.25	3.25 to 3.50	3.50 to 3.75	3.75 to 4.00	4.00 to 4.50	4.50 to 5.00 and higher	
10			0.020	0.055	0.085	0.105	0.125	0.125	0.110	0.120	0.130	0.140	0.150	0.155	0.160	0.170	0.180
11			0.030	0.075	0.105	0.070	0.085	0.095	0.105	0.115	0.125	0.135	0.140	0.145	0.150	0.155	0.160
12 to 13			0.005	0.015	0.025	0.035	0.045	0.055	0.065	0.075	0.085	0.095	0.105	0.115	0.125	0.135	0.135
14 to 16			0.000	0.005	0.015	0.025	0.035	0.050	0.060	0.075	0.085	0.095	0.100	0.105	0.105	0.105	0.105
17 to 19			0.000	0.000	0.005	0.015	0.025	0.035	0.050	0.065	0.075	0.085	0.090	0.090	0.090	0.090	0.090
20 and up			0.000	0.000	0.000	0.005	0.015	0.025	0.040	0.050	0.055	0.060	0.060	0.060	0.060	0.060	0.060

*These values are for spiral bevel gears only. A—Ratios.

similar gears with the full depth tooth. Consequently the standard of 2.000 in. ÷ D.P. has been retained for straight tooth bevels.

The bottom clearance specified in the system is 0.188 in. ÷ D.P., which is 0.06 × circular pitch, and is the minimum which experience shows to be necessary for the average job to assure against any bot-toming of the teeth. In the past 0.05 × circular pitch has been used and found to have been insufficient, while 0.07 × circular pitch, which has also been tried out, is more than is required.

Proportioning of Addendum and Dedendum

The method followed in proportioning the addendum and dedendum was to adjust them until the amount of sliding during approach was about the same or slightly less than the sliding action during recess. This also had the effect of making the arc of recess greater than the arc of approach, which is very desirable since recess action is quieter than approach. To obtain these conditions it was necessary to decrease the gear adden-dum and increase the pinion addendum as the ratios of the numbers of teeth in the gear and pinion became greater. These values of addendum for gear and pinion were originally worked out for each ratio and number of teeth, and from an examination of them it was found possible to make an arrangement in a simple tabular form according to ratios (see Tables II and IV) without any sacrifice of practical qualities.

Circular thicknesses were found entirely by making enlarged layouts in which the teeth were balanced up

partly on a width of top land and partly on a strength basis. The formulas given in Tables I and III were worked out so that they would give the same results as were obtained from the layouts.

System Represented in Practice

In conclusion it can be said that this system is not something new or untried, but in the case of spiral bevels at least is represented in practice by a large number of very satisfactory jobs. It also checks up closely with successful straight tooth bevel gear prac-tice, although the long and short addendum tooth has not been used as universally for straight tooth bevels as for spirals. The system, as presented, represents in a simple and usable form an intensive study of the question of bevel gear tooth design, treated from both a practical and theoretical standpoint.

System for Spur Gears Needed

It might not be out of place here to express the opinion that a standard non-interchangeable system, possibly along similar lines to the one just presented, is needed for spur gears. In fact, such a system should be of as great importance as a standard inter-changeable system, since a large proportion of spur gears, like bevels, are intended to operate in pairs only. The concessions made to allow interchangeability are so great that the case of the non-interchangeable gear should be granted as much consideration in the way of a standard system as is given to the interchangeable gear.

One of the Largest Ingot Molds Ever Made

An ingot mold which is claimed to be the largest iron casting ever shipped by rail is reproduced in the illustration. It is one of several made by the Wheeling Mold & Foundry Co., Wheeling, W. Va., for the use of the Naval Ordnance Plant at Charleston, W. Va.

This casting, whose actual shipping weight was 275,000 lb., was made from metal melted in six fur-naces. The iron was tapped into four ladles and poured into the mold in four minutes. The casting was

left in the sand eight days before cool enough for re-moval.

The shipping problem was a difficult one but was solved as indicated by the illustration. It was placed on especially constructed bridge girders between two special 75-ton capacity cars. A special train was re-quired to take it to its destination, 365 miles from the foundry.

These iron molds were used to make steel ingots for rolling into the largest sized armor plate for battle-ships and cruisers.

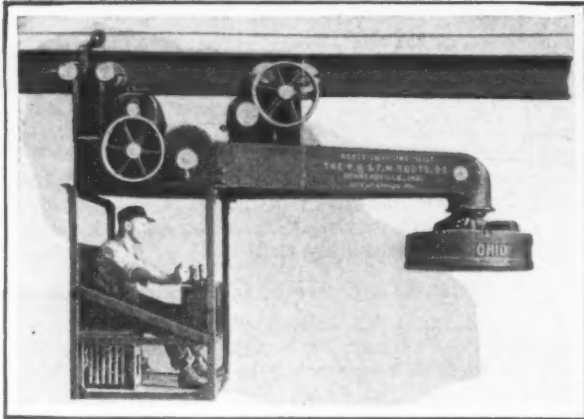


CUPOLA CHARGING HOIST

New Electrically Operated Machine for Reducing Labor Cost and Saving Refractory Linings

A charging hoist with cantilever arm, as shown in the illustration, to run in a cupola and discharge the load concentric with the center line of the cupola has been brought out by the P. H. & F. M. Roots Co., Connersville, Ind. The new machine is intended to reduce manual labor and also to reduce the cost of maintenance of the refractory linings of cupolas. In addition to charging, it can be used in handling castings after shaking out, and with a clamshell bucket can be employed in unloading coal.

The machine is electrically operated, either from



Iron or Scrap Is Picked Up on the Magnet and Deposited in the Cupola. The magnet is interchangeable with a drop bottom bucket for charging fuel or flux.

the floor or from overhead, picking up pig iron or scrap on the magnet and depositing it in the cupola. The magnet is interchangeable, by means of an automatic hook, with a drop-bottom bucket for use in charging fuel or flux.

It is claimed that all materials are deposited concentric with the center line of the cupola, which evenly distributes each charge. Materials do not come in contact with, and therefore do not cut away, the brick lining. In this connection it is pointed out that materials fed by hand, etc., bank on one side of the cupola and as such a charge works down melting becomes uneven. Materials on the low side of the bank are melted and thus give a direct outlet to the blast, which in turn helps to cut the lining. Materials on the high side become slightly chilled because of insufficient air, a condition which at the end of a long heat frequently necessitates dropping the bottom of the cupola, with a large amount of material not melted.

By mechanical charging with a magnet on the center line of the cupola, it is claimed that the great volume or weight of iron charged at one time will help pack the bed down and keep forcing the material in the melting zone without arching or bridging over. In methods of charging that tend toward bridging in the melting zone, this arch or bridge holds until a sufficient amount of material has been added to force it down. During this period of arching little iron is melted, which sometimes causes delays in securing molten metal and which frequently requires a shut down until the arch or bridge is broken.

The hoist operates in the bottom flanges of an I-beam section and is designed to travel around an 8-ft. radius in track. It is built with double swiveling four-wheel trucks, all four wheels of one truck being driven. The trailing truck is provided with an up-thrust roller to compensate for any cantilever action which may occur from overloading.

Three levers control the entire operation. The capacity with electric magnet, on rough sand-cast pig iron or scrap, is 300 to 600 lb., and with bucket, on fuel, 400 to 500 lb. Used as a vertical lifting hoist without magnet or bucket, the capacity is 2000 lb. The travel

speed, motor driven, is 300 to 350 ft. per min., and the hoist speed 25 to 30 ft. per min.

A feature emphasized is the quick change automatic hook for removing the magnet in using the machine as a straight hoist. This is of simple design and permits the operator to lower the hoist ropes with a U-hook into a funnel-shaped casting. The U-hook slides by gravity down an incline to the center line of the funnel casting and when the hoist ropes are reversed upward the U-hook automatically engages with the casting. This hook casting also forms a guard for the ropes and cable when hoisted and telescoped into the charging arm, preventing damage from heat and swinging, while depositing charges in the cupola. To release the hook the operator has only to lower and travel the hoist back until the ropes are on an angle. Then the hoist ropes and U-hook disengage the funnel casting sliding up the incline and out of the funnel casting.

The magnet cable is wound on the same drum as the hoist ropes. Current is collected on a copper, insulated band on the drum and delivered by terminals to the magnet cable. To change the ropes none of the mechanism need be dismantled.

In the hoist and travel mechanism all gears are of special semi-steel and the pinions, steel forgings. Teeth are cut from the solid blank. The frame of the machine is a semi-steel casting with machined joints and pads, cast in one unit. Drum and sheaves are of semi-steel, fully machined and grooved for coiling the hoist ropes and magnet cable without overlapping. The brake on the hoist motor is designed to hold full load torque of the motor and is mounted directly on the motor bracket. All bearings, track wheels, thrust-roller and sheaves, etc., are equipped with Hyatt roller bearings. Motors are of the crane type, fully inclosed, and controllers used are of the inclosed drum type.

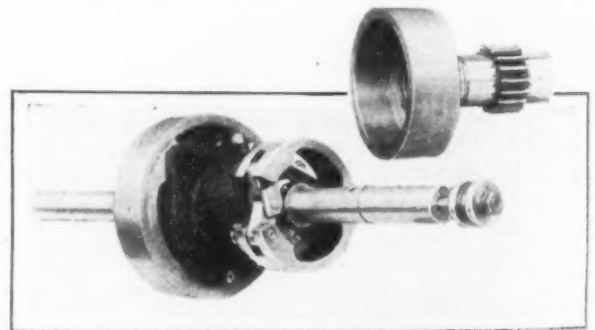
The main line switch is of the double-pole knife blade type, with blow-out fuses. An overload switch is provided to automatically cut out when motors are overloaded and a limit stop automatically stops the hoist at top of the lift. Accessibility of the mechanism is a feature claimed.

New Friction for Greaves-Klusman Lathes

The geared-head lathes of the Greaves-Klusman Tool Co., Cincinnati, are now equipped with a new design of clutch, constructed as shown in the accompanying illustration.

As pointed out by the company, the weakest part of its geared heads has been the friction, which alone has prevented putting more power through the machine. The previous friction employed expanded on one side only, had one-sided fingers for spreading the ring, had many joints, screws, etc., all of which made frequent adjustments necessary.

The new design expands the ring on both sides. The expanders are in the center of the clutch ring, giving



Friction Clutch for Geared Head Lathes

a direct pressure, and the levers have eccentric studs for adjustments, so that the leverage applied remains the same at all times. This eliminates twisting and springing of parts which cause wear and require frequent attention. The driving hub is in one piece for both the forward and reverse friction, with a long bearing on the shaft and a long driving key. The new friction has 50 per cent wider face, and is of larger diameter on some sizes.

Manufacturers Remiss in Export Returns

By Care in Preparing Forms Required by the Department of
Commerce in Connection with Outgoing Shipments,
More Reliable Statistics Can Be Obtained

WASHINGTON, June 13.—Monthly figures of the Department of Commerce covering exports of manufactured goods are prepared from thousands of reports required of exporters in the case of all outgoing shipments. Unfortunately, these reports leave much to be desired in the way of accuracy. As no export duty is charged, and the department does not keep close control over the unit prices of items going abroad, the reports as filled out contain great inconsistencies. It may be possible for someone to manufacture a cotton loom to sell at from \$5 to \$10, but this is not the type in use in commerce—and it was not stated that these were toys.

Officials of the department state in positive terms that all of this inconsistency is due to carelessness. They even say that, if the exporter or his agent has a \$5-a-week boy, that boy is charged with filling out these forms. Of course, this does not happen among the larger exporting organizations, accustomed to handling this business. Neither does it happen when a manufacturer, long in the exporting business, sends out his own goods.

When, however, a general exporting firm in New York handles machine tools one minute, shoes the next and perhaps wheat or ham the next time, and pushes through a tremendous amount of detail with the help of inexpensive clerks, these errors multiply.

Apparently the only way in which export figures can be made of real help, to the manufacturer and exporter of machinery, is by seeing to it that these forms are filled out accurately and that sufficiently intelligent clerical work is put upon them to make them reliable. Most of them already are reliable, but there are so many cases where they are not that the inconsistencies engender distrust of all the figures. In the following examples some of the inconsistencies will be shown, not only with regard to steel products but also non-ferrous products and, in still larger measure, machinery items. These figures are taken at random from reports submitted during January, February and March of this year.

Metals Heavily Undervalued

Galvanized wire consigned from New York to China has been given a price of 1.3c. per lb., which is less than half the quoted price of 2.75c. f.o.b. Pittsburgh. Barbed wire sent from New York to Guatemala was listed at 0.9c., in place of 3.15c. quoted in THE IRON AGE.

Copper wire shipped from New York to Australia was listed at 5½c., while the raw electrolytic copper to large buyers in the New York market was quoted by THE IRON AGE at 13½c. Brass wire consigned from New York to Cuba was given a price of 15.36c., which is far below its real value. Zinc bars sent from Buffalo to Canada were reported at 50c. per lb. This compares with zinc at 5½c. per lb. on the New York market. Alloyed steel bars shipped from New Orleans to British India were listed at 1.635c. per lb., obviously far too low.

Tin plate sent from New Orleans to Honduras was listed at 1c. per lb. or \$1 per base box of 100 lb. At the same time, the quotation in THE IRON AGE was \$4.60 per base box, f.o.b. Pittsburgh. Ship or tank plates, from Vermont to Canada, were reported at 1c. per lb., while the quotation at New York was 1.78c. per lb.

Galvanized wire shipped from Seattle to China was listed at about 1½c. per lb. The price f.o.b. Pittsburgh, as quoted in THE IRON AGE, was 2.75c. per lb., to which should be added 1.665c. for freight to the Pacific Coast, making the price at Seattle 4.415c. per lb., or almost four times the figure listed. Wood screws

forwarded from New York to various countries, at 11c. to 12c. per lb., were reported far below the correct figure.

Machinery Errors

Boilers, given in the reports in terms of horsepower and dollars, should average between \$20 and \$30 per horsepower. In January, however, boilers sent to Salvador showed \$52 per hp. and those to Cuba \$81, while boilers sent to Peru averaged \$6.30. Boilers sent to Japan showed \$65.50, or more than ten times the unit price of those sent to Peru. In February, boilers sent to British Honduras showed less than \$8 per hp., while those sent to Colombia were \$66 per hp.

Diesel engines to the number of 32 were exported to Canada in January. The total value was given as \$4,977, or about \$155 per engine. Two engines for aircraft shipped to Canada in January were listed at a total of \$275 and one in February at \$200. These compare with one engine shipped to Holland at \$5,000, which is a more reasonable figure. Neither engines of the power required by aircraft nor Diesel engines could be built for \$200 or less.

Dredging machinery shipped to Canada is listed at 10½c. per lb. Similar machinery shipped to British Columbia was given an export value of 48c. per lb., or more than four times as much. Two bucket, chain or belt conveyors, shipped to Canada, accounted for \$65.50 each, while eight others sent to British Columbia were less than \$50 each and eight to Mexico about \$52 each. These compare with one sent to Peru at \$3,600. While it is possible that a small conveyor might be sent out at \$50 or thereabouts, it is unlikely that any business would be built up in such small units.

One steam pump exported to British India in February is listed at \$24; this is possible but not probable. Pumps and pumping machinery (other than certain specified classes) sent to Holland in February averaged 79c. per lb. and that to British Columbia, 85c. per lb. This compares with 5½c. per lb. for similar equipment sent to Portugal. The entire shipments under this heading during that month averaged a little over 34c. per lb., showing that some of the figures were largely over-estimated and some heavily under-estimated.

Machine Tools Listed Too Low

One lathe shipped to Netherlands in January was listed at \$20. Twenty-five boring and drilling machines sent to the same destination averaged \$6.12 each. Boring and drilling machines sent to British Columbia averaged \$3.05 each. Either these machines were of a character unknown in American machine shop practice, or there was a great error made in the value assigned to them for export. Six milling machines were shipped to Salvador in January, at an average price of less than \$60 each. Five similar machines were sent to Costa Rica at an average of about \$43 each. In the February list, \$5 is given as the average price of boring and drilling machines sent to Holland and to Switzerland and of milling machines sent to Mexico. Two lathes at a total value of \$13 were sent to Manitoba and one listed at \$17 to China. Similarly, punching and shearing machines were listed at \$25 to \$50, which is far below par.

In February, 111 sharpening and grinding machines were sent to France, at a total of \$2,028, or an average of \$18.25 per machine. If the price is correct the machines were misnamed. During that same month one such machine, listed at \$10, was sent to British India; two to New Zealand averaged \$6 apiece and four to French Oceania \$5 each, while the Philippine Islands received \$3 machines.

Two portable pneumatic tools shipped to Mexico in January had a total estimated value of \$6, while forty-six similar tools sent to Canada averaged less than \$5 each. This compares with an average of more than \$100 each for similar tools shipped to Australia and to British South Africa and almost \$100 on those to England. It is apparent that the low figures quoted are incorrect; it is possible that they referred simply to loose tools for fitting into the portable pneumatic equipment, but if this were so, it was incorrect listing, for a classification is provided for such tools separately.

Air compressors shipped to Manitoba and to Cuba are reported at below \$55 each. Five air compressors sent to Eastern Canada averaged less than \$25 each, evidently a great under-estimate. Refrigerating and ice making machinery exported to France and to Spain averaged in February \$1.20 per lb. Similar machinery sent to England and to Japan averaged about 16c. per lb., or not much more than one-eighth the other figure.

Mine cars exported to Cuba averaged in February \$2,700 each; those sent to Peru only \$85 each. It is possible that the cars to Cuba were electrically propelled and that those to Peru were intended for haulage by mule; otherwise the discrepancy does not appear explainable.

These examples have been given in the hope that manufacturers and their agents will see how grossly they are misleading themselves by forwarding inaccurate returns. The great value of reports issued by the department lies to those who are making and shipping the machinery. They are the beneficiaries of the policy of reporting these items, and they are the sufferers if the items are incorrectly reported.

It might be thought that these errors would automatically work themselves out—that is, that there would be enough over-estimate to balance the under-estimate. This, however, does not appear to be so—nearly all of them show under-estimate. Perhaps this is psychological—it may be that the manufacturer has an idea that these figures will be used in imposing import duties at the country of destination. But those countries obtain their own figures, and the reports upon which the United States export statements are based do not find circulation outside the United States. Thus any effort to minimize the figures in the hope of securing a reduction in customs duty at the other end is effort wholly wasted.

Accuracy alone can justify these reports and accuracy alone can satisfy the requirement of the manufacturer for information helping him in his business.

ELECTRIC STEEL IN ITALY*

Development of the Industry—Number and Types of Furnaces and Output

FOR many years the only type of electric furnace used in Italy was that of 1-ton capacity made by Stassano, but the great difficulty in finding suitable refractory material and electrodes kept back the development of this new industry. In 1910, the first Girod furnace made its appearance, followed later, in 1912, by a Heroult furnace installed in the shops of Mannesmann, pipe and tube manufacturers at Dalmine.

The production of electric steel in Italy then started to show a continuous increase from 1915 up to the present, and without doubt, when the figures for 1921 are known, they will exceed the 140,000 tons mark. Yet this figure represents only one-fifth of the total yearly production of steel in Italy, because at present the scarcity of water in the northern part of the country, where most of the hydroelectric power houses, supplying power to the largest steel mills, are seriously affected.

The production of electric steel in Italy since 1915 was as follows:

Year	Total Production, Tons
1915	20,270
1916	32,800
1917	47,650
1918	74,000
1919	89,000
1920	100,000

There are 180 electric furnaces of various types and capacities and more than half of them, specially the largest ones, are installed in the northern part of the country. The electric furnaces of the various types are distributed as follows:

Heroult furnaces (23) of 15 tons capacity each at:

Place and Location	Number
Acciaierie Ernesto Breda, S. Giovanni.....	6
Ferriere e Acciaierie Lombarde, S. Giovanni.....	5
Stabilimento di Dalmine, Bergamo.....	4
Acciaierie Ansaldo Aosta.....	4
Acciaierie Franchi Gregorino Allione, Brescia.....	3
Acciaierie di Terzi, Roma.....	1

Heroult furnaces (10) of smaller capacity at:

Acciaierie Redaelli Rogoredo, Milano.....	3 of 7 tons
Stabilimento di Dalmine, Bergamo.....	2 of 6 tons
Acciaierie Cravetto Verres.....	3 of 5 tons
Acciaierie del Caleotto Lecco.....	1 of 8 tons
Acciaierie Ceretti Villadossola.....	1 of 8 tons

Eleven Girod furnaces are distributed among the following mills: Franchi Gregorino, Franco Tosi Legnaro and Acciaierie di Castelnovo del Sabbioni.

Four electrometal furnaces of 3 tons capacity are equally divided among the Siderurgica Togni at Brescia and Fondlerie Milanese d'Acciaio at Milan.

*By Dr. Stromboli, Torino, Italy.

One hundred and two Stassano furnaces, of which 30 are of 1-ton capacity, are installed in 12 or 13 small foundries; 2 furnaces of 5 tons capacity installed at the shops of the Acciaierie Breda and the last 70 furnaces of modified types, known as Bassanesi, Angelini, etc., are installed throughout the country in foundries, shipping yards, etc. Also, other furnaces of small capacity, as the Catani's furnaces, are found in the country.

The 13 Fiat furnaces are distributed as follows: Acciaierie Piemontese, 4 of 20 tons, 2 of 6 tons and 2 of 3 tons capacity; Fiat Works, 6 of 5 tons and 1 of 1½-ton capacity.

The Fiat electric furnaces represent the true type of the Italian electric furnaces of large capacities and on them are centered all hopes of a rapid development in the Italian electric steel industry. A yearly production of 300,000 tons of electric steel within a very short time would be a very conservative expectation.

Progress of Standardization in Belgium

Great strides toward standardization, particularly in the construction, metals, mining and electrical industries of Belgium, are indicated in a report from the Association Belge de Standardization which has just been received by the American Engineering Standards Committee, 29 West Thirty-ninth Street, New York.

The report shows that the following standards have been approved for issue in Belgium:

- Rules for the construction of steel roof trusses.
- Rules for the construction of steel tanks.
- Rules for the construction of galvanized, corrugated roofs and partitions.
- Standardization of steel bridges.
- Tentative list of equal angles.
- Standardization of shafts and pulleys.
- Standardization of bolts and rivets.
- Standard requirements for electrical machinery.
- Electrotechnical vocabulary.

These standards, with the exception of the tentative list of equal angles, have been printed and copies are now available through the American Engineering Standards Committee. The tentative list of equal angles is up for printing.

Pittsburgh Basing Point Hearing at Chicago Ends

CHICAGO, June 10.—The Federal Trade Commission adjourned its Chicago hearing on the Pittsburgh basing point yesterday and will spend the fore part of next week in Duluth, following which it will return to this city to conclude the taking of testimony here on Thursday, June 15. The commission will then go to Birmingham, Ala., to take testimony and subsequently will hold a hearing at Chattanooga, Tenn. There will then be a summer recess, following which a hearing will probably be opened at Washington, in the fall.

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ESTABLISHED 1855

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An Ungagged Rail

The straightening of steel rails is one of the most exacting operations in the manufacture of this important product. The gag press is cumbersome and expensive. Magnetic tests have demonstrated that the use of this machine frequently strains the metal beyond its elastic limit, and some failures in service have been traced back to blows given in cold straightening.

The complete elimination of the gag press and the straightening of rails by a new and simple process is a recent development. A large producer of rails has been conducting experiments which thus far have afforded striking results. The operation is nothing more than the suspension of the hot rail by one end so that its own weight is the main factor in insuring alignment. The simplicity of the method and the fact that it has not been thought of before are two features that put it in very good company among successful devices. It is stated that the rails thus straightened are capable of track installation and performance at least as efficient as is secured under present practice.

It is unnecessary to emphasize what the perfection and adoption of this procedure will mean to rail producers and users. There is also the possibility that the process may be linked up with the heat treatment of rails—when the railroad companies, particularly those whose lines run into the higher latitudes, are willing to make an additional rail investment to insure greater protection against winter failures in track.

Unions Amenable to State Courts

The decision of the Supreme Court of the United States in the case of the United Mine Workers of America, plaintiffs in error, against the Coronado Coal Co. was perfectly clear in holding that labor unions, whether incorporated or not, must be held responsible for their acts. But the remarks of the court in regard to the members of the miners' union not being subject to action in Federal courts unless they intended to interfere with interstate commerce, were somewhat perplexing to many who read it, and the question has been raised whether suit for damages could be instituted in State courts. With his great

clearness of vision James A. Emery, counsel of the National Association of Manufacturers, has expressed the import of the decision in the following brief statement:

The unanimous opinion of the Supreme Court in the Coronado case imbeds in the Federal jurisdiction a great truth approved alike by common sense and common law. There must be no use of organized power without corresponding legal responsibility for its exercise. The union, like the corporation, employing its organization and funds to force its arbitrary will upon the free movement of trade and traders, must answer as an entity, as it acts as an entity, for all wilful injury inflicted by its agents. Every State bench will respond to this great declaration, reaching with remedial hand the outlaw acts of irresponsible power.

In other words, the unions cannot escape by a technicality. If their illegal acts do not aim at interference with interstate commerce and cannot be brought to judgment in the Federal courts, the way is open for criminal prosecution or civil action for damages in the State courts.

There is evidence that at least some of the labor leaders have interpreted the decision just as Mr. Emery has and see that the only course before them is to appeal to Congress to change existing laws. But it is doubtful if even that policy would get permission for the unions to do as they pleased in times of strikes. These leaders are to be congratulated, however, upon one point—that they are advocating a perfectly proper procedure in appealing to Congress to help them, whereas in the past some of them have openly advocated defiance of the Supreme Court and other courts and of laws which did not meet their approval.

Several factors stand out in the analysis of the ferromanganese situation elsewhere in this issue. One is the low rate of output for both ferromanganese and spiegeleisen thus far this year as compared with steel works operations. Ferromanganese production, with imports added, is and has been far below theoretical requirements. A second fact is that manganese ore imports into Great Britain are lower than at any time for many years, with stocks probably light. American ore imports are also light, though the leading producer is understood to be well sup-

plied. Besides this, there is the record of phenomenally low ferromanganese output last year, both in the United States and Great Britain, lessening the probability of reserve stocks. Large British supplies do not seem probable, and ore and coke scarcity may limit output here. There is also the increasing percentage of open-hearth steel in the total steel output. Nevertheless the manganese industry has always met even such crises as those of the war and a scarcity is not likely to be long-lived if it develops at all.

"Revolutions" a la Unger

Dr. John S. Unger, research engineer of the Carnegie Steel Co., thought to give a lighter touch to the after-dinner program of the American Iron and Steel Institute at its recent New York meeting. He evidently had in mind the weariness suffered by the diners on one or two previous occasions—one in particular, when statistics were read to them with deadly iteration, after they had settled themselves comfortably to listen to some spellbinder who might give a fitting prelude to Charles M. Schwab himself. In the space of a few minutes Dr. Unger let loose more "revolutions" in iron and steel works practice than one could find in six months' reading of the Sunday supplements. And what is more, he made a hit. So much so that even in such a presence there were those who questioned whether some part of the prophecy for "the next quarter or half century" was not meant soberly, being not entirely willing to think that the learned doctor was spoofing them.

Some editors, however, have had no serious conflict of thinking on the Unger predictions. One, after reminding his readers that "only a brief time back the telephone and the wireless were in the dream stage," suggests that Dr. Unger "does not begin to visualize the things that are about to be unfolded to us," and doffs his hat to the "men of Dr. Unger's type, unafraid to dream and even to state their dreams, who will bring these things into being." And the writer for the Sunday supplements has been prompt to spread the news of the coming conquests of "Clay as a Substitute for Steel," this summary of the Unger program appearing in a New York paper of June 11:

Mr. Unger sketched his ideas of a complete revolution in steelmaking while attending the meeting here of the Iron and Steel Institute of America.

"I believe," said Mr. Unger, "that the metal of the future will not be iron, but a composition, the chief components of which will be aluminum, silicon and iron—known ordinarily as common clay or loam."

Silicon is one-fourth as heavy as iron. The lightness of aluminum is well known. Being mixed with iron and properly treated, this combination will form a substance which can be used in cables, or beams, or rails, as steel is now. Besides having the advantage of lightness, the substance is non-corrosive.

"The iron ore barge of the future, with a 10,000 ton load," he predicted, "will be floated into a drydock, where it will be turned upside down and shaken out, the whole operation requiring less than half an hour."

The big monoliths of industry, the great stacks of the blast furnaces which disgorge fire and rolling smoke into the sky around Pittsburgh, will all disappear and be replaced by furnaces not more than 25 feet in height. This change will come to pass in a decade or a quarter of a century, when the price of oxygen has been reduced from \$160 to \$10 a ton. The use of oxygen to speed combustion will so increase the

efficiency of ore reduction that the ore will be fed into the furnace in a continuous stream and the molten metal issue forth from a tap in a continuous stream, doing away with the tedious "make-ready" for the ore-blasting process.

Steel pipes, boilers and cylinders are not going to be rolled and formed by the "antiquated" processes of to-day, but the molten metal will be kept in a highly elastic state and shaped by compressed air after the manner of glass-blowing.

And the next chapter? A series of scoffing editorials in the European technical and near-technical press, exhibiting the proposals of the Carnegie research engineer as fresh examples of Yankee bumptiousness and boasting.

Steel Shrinkages in 1921

Publication of the complete steel production statistics for 1921 supplies interesting information as to what occurred industrially in the year, as there were important divergences in the distribution of the steel into the different finished products. As to the total ingot production, that was known approximately at the close of the year. In the Annual Review Number of THE IRON AGE it was estimated that the ingot output was probably above 19¼ million tons, while the full statistics made public late last week by the American Iron and Steel Institute give the amount at 19,184,084 tons. This and 559,713 tons of steel castings made a total of 19,743,797 tons.

The steel output was less than half of that in 1916, 1917, 1918 and 1920. It was 42 per cent of the record output, made in 1917. As to the back-set in point of time, it was the smallest output since 1908. It was simply larger than the output in any year prior to 1905. Steel production is frequently referred to in percentage of capacity, though the reference is not as illuminating as it used to be before the war. The output was 36 or 37 per cent of capacity, but a capacity operation would require remarkable conditions. Men would have to work very hard in producing and consuming steel and the railroads would have to function very well indeed.

Of the important finished steel products, relatively the lightest output was that of structural shapes, only 1,272,024 tons, against more than 3,000,000 tons in 1913, 1916, 1917 and 1920. As far back as 1902 we made slightly more structural shapes. The plate mill output of universal and shread plates of any thickness was 1,760,324 tons, to which it might be well to add the output of jobbing mills, in 12 gage and heavier, as the operations of these two classes of mills overlap somewhat, making a total of 1,904,453 tons of material 12 gage and heavier. This compares with totals similarly computed as follows: Two years, 1918 and 1920, showed more than 5,000,000 tons; two years, 1917 and 1919, showed over 4,000,000 tons, and the five years, 1912 to 1916 inclusive, showed between 3,000,000 and 4,000,000 tons. The smallness of the 1921 plate production was forced by a number of factors: the great and sudden decline in shipbuilding, the small amount of freight car building, the inactivity in fabricated steel construction and the decreased requirements of the oil trade, in tanks and line pipe.

Sheets 13 gage and lighter, on the other hand, held up very well, the output being 1,367,688 tons.

This was 46 per cent under the record output, made in 1920, but was larger than the output in 1909 or any preceding year.

The total rolled product in 1921 was 14,228,329 tons of steel and 545,677 tons of iron, or 14,774,006 tons altogether. Only in 1908 and the years prior to 1905 was production less. The rolled iron output was the smallest for about 60 years.

The proportion of finished rolled steel to ingots in 1921 was 74.16 per cent, against 75.76 per cent in 1920. This percentage has held quite uniform for many years, except for the war years when there were heavy discards in making shell steel.

Announcement of the precise output of ingots in 1921 makes possible an exact comparison of the Steel Corporation's contribution. This was unusually high—57.2 per cent, against 47.2 per cent in 1920, 51.0 per cent in 1919 and 45.5 per cent in 1918. Judge Gary gives the proportion of the corporation's ingot capacity at 45 per cent, which is conservatively high. The market reports of the year certainly did not indicate that the corporation was getting more than its capacity share by underselling its competitors, there being on the contrary numerous references to "independents cutting the Steel Corporation's prices."

Our Foreign Foundry Friends

The plan initiated about a year ago for an exchange of papers between British and American foundrymen was given splendid impetus at the convention of American foundrymen last week in Rochester. The first British paper was not only presented by its well-known author and profitably discussed, but it formed the basis of a notable international meeting.

The Rochester convention demonstrated conclusively the value of such exchange papers, especially when presented by the authors themselves. There are also the advantages of foundrymen and their work being seen as others see them, and of an exchange of ideas and the clearing up of misunderstandings.

Partly because of the presence also of two prominent French and Belgian foundrymen, the question of establishing international co-operation or even an association was brought seriously to the front. Doubtless the great variance in methods of testing and other differences in practice have contributed to present misunderstandings, particularly in gray iron. As a result some vital problems are left undecided. There was a strong sentiment at Rochester for the revival of the plans for co-operative effort, particularly in investigations, which were abruptly stopped by the war.

It is to be hoped that the good feeling and the good intentions begotten by the recent visits of European foundrymen, among whom were the president and two past presidents of the Institution of British Foundrymen, will have tangible results for the industry. There is no question that American foundrymen can learn from the foundrymen of Europe. From England came much of what the American foundry trade knows

about cast iron; and speaking of recent practice, there is no gainsaying the advance made by some British foundries in the manufacture of Diesel engine castings. On the other hand, American producers of malleable castings are quite sure of the advance they have made over practice in Great Britain. Personal contacts have done a great deal and will do much more in furthering the work so well started in the exchange of papers between the two national associations.

REACTION IN JAPAN

Steel Market Weakening—Copper Advancing with High Duty

TOKYO, JAPAN, May 5.—A change for the worse has come about in the Japanese steel market, due to the large stocks of steel products in the customs sheds and to the Government Steel Works announcement of an immediate sale of surplus. There is also the growing difficulty of the credit situation. With increasing signs of weakness, it is expected that formal price reductions will soon be announced. Japanese pig iron production has been reduced for some time and now only five or six are in operation. Pig iron stocks, which stood above 440,000 tons at the beginning of last year, are now down to about 210,000 tons. Indian iron for some time has been coming into Japan in fair quantities and there is the possibility that the Government Steel Works may put some of its pig iron product on the market.

Provisional tariffs on copper, brass and bronze, endorsed by the Japanese Imperial Diet, have come into force in Japan in spite of the protest from merchants handling these metals that the new tariff is framed to protect only a few at the expense of many. The tariff is only temporary and ceases to be operative as soon as the copper market is stabilized. Japanese copper smelters and holders have counted much on this legislation, and their quotations have risen rapidly since its passage. But importers, in anticipation of its passage, had been active since the beginning of the year. The total importations of brass and copper since Jan. 1 have been over 18,000 tons. It is estimated to-day that a six months' supply is on hand.

Meanwhile, buyers of copper are keeping out of the market. Japanese producers of copper wire, who have had a good business in China, are facing competition there from foreign wire manufacturers, and in view of the drastic increase in the copper duty, which amounts to nearly 500 per cent, are fearful of losing a part of their Chinese market. The amount of American copper now stored in customs sheds in Japan is estimated at 5000 tons. This is expected to hold prices somewhat in check.

At a meeting of the Cincinnati Chapter of the National Association of Purchasing Agents held at the Gibson Hotel in that City on June 6, reports were received that Cincinnati and Northern Kentucky manufacturers will shortly be successful in their fight for reduced coal rates on the L. & N. railway from the Eastern Kentucky coal fields. The present rate from this field to Cincinnati is \$2 per ton and to Northern Kentucky, \$1.90 a ton. The new rates are expected to be \$1.75 and \$1.56 respectively.

The Hendee Mfg. Co., Springfield, Mass., motorcycles, is operating 48 hours a week with 1200 on the payroll, and running night shifts in some departments. The company in May produced 1,000 machines, as it did in April, and has sufficient business booked to maintain this rate of production for some time.

The Bethlehem Steel Corporation's steamer Bethore, one of the ore carriers designed specially for the haul from Chile, brought 19,000 tons into New York harbor last week for unloading at the Lehigh Valley docks at Constable Hook.

HIGHER PUDDLING RATE

Employers and Employees Agree in Conferences at Atlantic City

YOUNGSTOWN, June 13.—An advance in the base rates for boiling metal was granted by Mid-Western bar makers in the new agreement with workers, for the 12-month period beginning July 1. The base puddling rate is increased from \$5.50 to \$6 per ton on a 1c. card rate, while a 50c. advance applies at all card points above the 1c. card rate. For the May-June period, the boiling rate of \$7.63 is based on a 1.50c. card; under the new agreement this would be \$8.13.

Growing scarcity of puddlers is assigned as one reason for the action, manufacturers conceding the necessity of making the remuneration sufficient to attract young men to this branch of the industry.

Otherwise the new agreement is virtually unchanged from that in effect the past year, which expires June 30. Employees withdrew their request, following conference with makers, that workers on guide, 10-in., hoop and cotton tie mills be paid the scale of 1920-21 on all extra price orders, which would have amounted to an increase in tonnage rates approximating 12½ per cent. No change was made in charging time on all single turn mills, as requested.

The conference was conducted beginning June 5 and concluding Friday evening, June 9, at Atlantic City,

between the Western Bar Iron Association and the Amalgamated Association of Iron, Steel and Tin Workers. M. F. Tighe of Pittsburgh, president of the employees' organization, presided at the joint conferences between the manufacturers and workers. S. C. Leonard of Chicago, general manager of the Western Rolling mill department of the American Car & Foundry Co., is president of the manufacturers' association, and presided over sessions of the employers. Twenty companies were represented at this conference, and sessions were held at the Marlboro-Blenheim.

The bar iron conference closely followed the annual conference between representatives of employees and the Western Association of Sheet and Tin Plate Manufacturers, when the sliding scale agreement was renewed by affected employers and workers as reported in THE IRON AGE last week. Tanners on coke machines, representing but a small percentage of tin house employees, were given a 5 per cent reduction, under terms of the new agreement. Another change in the tin mill scale was the elimination of extra pay for the doubler and his helper and the heater and his helper when No. 28 gage is doubled twice. Otherwise the 1921-22 agreement was adopted in its entirety. The men had asked that where the practice of loose rolling, involving the rolling of sheets singly instead of in packs, is in effect 35 per cent above the scale price shall be paid, but this was rejected.

Eighteen companies participated in the conferences on the sheet and tin plate agreement.

Refractories Market—Pending Merger of Fire Brick Companies

PITTSBURGH, June 12.—Undoubtedly the chief item of interest in the refractories market at the present time is the pending merger of three or four leading fire brick companies likely to be made in the next two weeks, to be followed by a still larger merger of two of the leading refractories interests. The first move in the consolidation of fire brick plants is being made this week, and consists in the taking over by General Refractories Co. of the Pennsylvania Fire Brick Co., Beech Creek, Pa., the price reported as being \$191 per preferred share of this company, having a par value of \$100. The General Refractories Co. is also contemplating taking over the Hayes Run Fire Brick Co., at Orbiston, Pa., Standard Refractories Co., Claysburg, Pa., Haws Refractories Co., Johnstown, Pa., and the Hawstone Fire Brick Co., near Johnstown, Pa. The deal for the taking over of the Pennsylvania Fire Brick Co. is practically concluded, while negotiations are under way with the other concerns named above.

The second merger in the fire brick trade is that of United States Refractories Corporation, with main offices in Mount Union, Pa., and Pittsburgh, which is negotiating for the purchase of the fire brick plants owned and operated by Hiram Swank's Sons, at Irvona, Pa., Clymer, Pa., and Johnstown, Pa. Should the General Refractories take over the plants above named, it will be second largest producer of refractories in this country and will have a capacity of 212,000,000 9-in. equivalent fire brick per year, the largest being the Harbison-Walker Refractories Co., Pittsburgh, which is said to have an annual capacity of about 450,000,000 9-in. equivalent fire brick per year. During this week there will likely be important developments regarding these mergers.

Probably due to the coming freight rate reductions, effective July 1, the new demand for fire brick and silica brick showed a falling off in the past week, the plants running on an average of 50 to 55 per cent. Prices are reported as remaining firm, and it is claimed that Pennsylvania high duty fire clay brick is now firm at \$32, with possibly a sale here and there as low as \$30 per thousand. It is certain that the latter price is minimum of the market, and is given only to very special customers on desirable orders. So far the coal strike has not materially affected the output of refractories.

The Harbison-Walker Refractories Co., Pittsburgh, has been given the contract for the fire brick for relining No. 3 blast furnace of the Shenango Furnace Co.,

Sharpsville, Pa., and also for relining one of the stoves. The demand for blast furnace fire brick is better than for some time, and while no new furnaces are being built, some are being remodeled and enlarged, needing considerable fire brick for these purposes.

Demand for building brick in Pittsburgh and nearby districts is heavy, and makers are unable to supply enough promptly to meet the urgent demand. Building activity in the Pittsburgh district at the present time is greater than at any time for 10 years, and makers of building brick of all kinds are taxed to the utmost to meet the demands of contractors. First quality red face brick is selling at about \$26 per thousand at makers' works while ordinary building brick is quoted at \$20 to \$21 per thousand.

We quote per 1000 f.o.b. works:			
Fire Clay		High Duty	Moderate Duty
Pennsylvania	.....	\$32.00	\$30.00 to \$32.00
Ohio	.....	\$30.00 to 32.00	28.00 to 30.00
Kentucky	.....	32.00 to 35.00	30.00 to 32.00
Illinois	.....	32.00 to 35.00	30.00 to 32.00
Missouri	.....	32.00 to 35.00	28.00 to 32.00
Silica Brick			
Pennsylvania	.....		30.00
Chicago	.....		35.00 to 37.00
Birmingham	.....		40.00
Magnesite Brick			
Standard size per net ton (f.o.b. Baltimore and Chester, Pa.)			53.00
Grain magnesite per net ton (f.o.b. Baltimore and Chester, Pa.)			28.00
Chrome Brick			
Standard size, per net ton			40.00 to 42.00

Portland Cement Association to Meet

A regular meeting of the Portland Cement Association will be held at Hotel Traymore, Atlantic City, N. J., June 27 and 28. On June 27 the program will consist of the following papers:

"Steel and Iron and Their Application in The Cement Industry," by W. R. Shimer, sales metallurgist, Bethlehem Steel Co., Bethlehem, Pa.

"Quality Control in Cement Manufacture," by Richard K. Meade, Consulting Engineer, Baltimore, Md.

On June 28 the regular business session will be held.

For the first time in more than two years, the State-City free employment bureau at Youngstown, Ohio, has inserted display advertisements in local papers for skilled labor needed in Youngstown steel and other manufacturing plants. It is said there is a shortage of both skilled and common labor in the Youngstown district, especially in common labor. There is also a shortage in common labor in the Sharon, Pa., Warren and Niles, Ohio, manufacturing districts.

COAL STRIKE SITUATION

Pittsburgh Steel Co. Resumes at One-Fourth of Its Ovens—Miners Refuse to Confer

PITTSBURGH, June 13.—The most important development in the soft coal strike, which is now two and one-half months old, was the success achieved by the Pittsburgh Steel Co. in securing a number of miners to go into its mines, which supply coal to its Alicia No. 1 works in the Connellsville district. The result was the starting up of 100 ovens out of 400 at this plant. This is the largest number of striking miners that have returned to work at any one plant since the strike started. The company is using the coke made for its No. 1 blast furnace, Monessen, Pa., which was blown in last week. What effect the return of these miners to work will have on other miners on strike in the district where the Pittsburgh Steel Co. mines are located has not yet developed, but it is believed it will have a good effect upon the general situation. So far there has been no attempt to import men from other districts by operators to get the idle mines started, as it is believed such action would result in disorder and possibly in rioting. The situation is regarded as tense, and any attempt of operators to bring in men from other districts would certainly be strongly combatted by the striking miners.

While it is true that the output of coal is increasing to some extent, the available supply is steadily getting lighter. Consumption of coal is heavy at present, due to the activity in the steel trade, and demand is so good that not only is all of the coal that is being mined quickly used up, but stocks are being steadily drawn upon, so that if the present condition lasts over the next four or five weeks, stocks of coal will be pretty well used.

Another important development of the strike in the past week was that some of the larger coal operators belonging to the Coal Producers' Association of Pittsburgh, sent out an invitation to the leaders of the strike asking for a conference in an attempt to settle the strike in the western Pennsylvania district. Very promptly the officials of District No. 5, United Mine Workers, declined the invitation.

Developments in the Connellsville Region

UNIONTOWN, PA., June 10.—Memorial Day holiday layoff checked progressive production gain in the Connellsville bituminous region and wiped out the net increase in operations which began during the sixth week of the walkout. Regional output was reduced to 48,470 tons, the lowest recorded during the strike to date. Careful analysis, however, shows that this was due to holiday recesses and not due to any further inroads made by union organizers. Sentiment among men still idle in favor of returning to work is growing, but just how soon this will be reflected in an en masse break seems problematical. Your correspondent has had reports from half a dozen different points in the region to the effect that groups of miners have notified union officials that unless relief is forthcoming by June 15, the men will return to their places in the mine. These reports are vigorously denied by union representatives, but there is a real basis. Whether the men will carry out their ultimatum remains to be seen, however.

Alicia plant of the Pittsburgh Steel Co. has been added to the active list. This is the most significant development of the week in the southern Connellsville field. A few ovens have been fired at Leisenring No. 1 plant of the H. C. Frick Coke Co., this plant having been forced to close by the union sympathizers. Union leaders at a meeting here last week declared that Leisenring No. 2 plant of the Frick company had been forced down. This is not true. As a matter of fact, the Leisenring No. 2 plant is operating at around 90 per cent, with a full 100 per cent of diggers in the mine. Your correspondent understands that Frick operations have increased on an average of 34 per cent during the

past three weeks, although, of course, these figures are not official.

Efforts at establishing a fair price for coal in the Connellsville region have failed. W. W. Parshall, J. Edgar Hustead, E. D. Brown and T. J. McClernan, representing Fayette county operators, met with Secretary Herbert Hoover in Washington on Thursday afternoon. They asked that \$4.50 be declared the maximum for this region, declaring that the extra dollar per ton above agreed upon price in other fields was necessary because of heavy expense entailed in guarding mine properties in the region. Mr. Hoover declared he could not agree to such a price, and the whole price situation as it pertains to the Connellsville region was left open. Coal prices in the region this week have not regarded the Hoover \$3.50 price, which was suggested for other regions in Washington conferences. Sales have been reported at \$3.50 to \$4, with the majority at \$3.75 and \$3.90. There are no adequate quotations on coke because there is no spot coke available.

There are hundreds of miners in the region who would return to work immediately, but they are afraid of bodily harm and damage to their property.

Coal Output Increasing

WASHINGTON, June 13.—With an occasional exception, production of bituminous coal has shown an increase each week since the strike began on April 1. According to the Geological Survey the output in the tenth week (June 5-10) is expected to pass 5,000,000 tons as compared with 4,623,000 tons in the ninth week. It is to be recalled, however, that there was an interruption of output during the latter week owing to the combined effect of Memorial Day and pay day. The accumulation of unbilled cars at the mines fell rapidly during the tenth week. Consumers' stocks of both anthracite and bituminous coal are being drawn upon steadily. "As the present rate of consumption," the Survey says, "is not known accurately, the amount withdrawn from storage each week cannot be stated."

Higher records of car loadings were established during the tenth week. On Wednesday, June 7, loadings passed the 16,000-car mark for the first time since the strike began, and on the day following, another high record of 16,289 cars was set.

May Sue Labor Union

Following the decision of the Supreme Court in the Coronado coal case, the Newport Rolling Mill Co., Newport, Ky., is planning a damage suit for \$500,000 against the Amalgamated Association of Iron, Steel and Tin workers, as a result of the strike at the company's plant which practically closed it down for over a year. The attorneys for the Newport Company are studying the Supreme Court decision with a view to entering a suit in the Campbell County Circuit Court. The Newport company claims that interstate shipments from its mills were interfered with by strikers and that the strike was approved by the Amalgamated Association with headquarters at Pittsburgh last October.

The powdered coal installation at the River Rouge plant of the Ford Motor Co., involving the burning of powdered coal in four 2640-hp. steam boilers, has been described in an illustrated pamphlet obtainable from the Combustion Engineering Corporation, Broad Street, New York. It amounts to a reprint of a paper read before the mechanical section of the Engineers Society of Western Pennsylvania, by H. D. Savage. One of the illustrations shows the boiler setting and the position of the Lopulco coal burners and the tremendous size of the combustion chambers of the boilers. The pamphlet includes a report of the discussion which followed the reading of the paper.

Iron Ore Prices Reduced Fifty Cents

Railroad Rates Reduced 10 Per Cent by Northern Railroads
by Order of Interstate Commerce Commission—
Other Charges Lowered

CLEVELAND, June 13.—Ore prices were established at a reduction of 50c. per ton from the 1921 prices by a sale of 175,000 tons by one of the leading Cleveland shippers June 9. Up to the time that prices were named there was an uncertainty whether the cut would be 25c. or 50c. a ton. Some of the mining interests wished to hold approximately to last year's prices at the mines which would have meant a reduction of only 25c. a ton. The mine operators will save 26.8c. per ton this year in transportation and handling charges and taxes and the net reduction in their prices at the mines is 23.2c. per ton.

The new price represents a decline of \$1.50 per ton from the peak prices of 1920, \$1 per ton reduction having been made last year. This year's reduction brings prices back to where they were in 1917 and up to July 1, 1918. With the exception of in 1921, when prices were named a week later, or June 16, the announcement of prices came later this year than at any previous time in 30 years. Since the fixing of prices, reservations for considerable ore made by consuming interests have been written into contracts and these consumers are calling for good-sized tonnages. A few inquiries that have been pending awaiting the naming of prices have now resulted in actual sales. One new inquiry from a consumer, not having mine connections, for 50,000 tons of ore has come out since the naming of prices, but no signs appear yet of an active buying movement. With the fixing of prices and transportation charges, shipments will show a marked increase within a few days.

The Pittsburgh Steamship Co. plans to have all its boats in operation about the end of the week. Ore on docks June 1 amounted to 6,493,045 as compared with 8,083,839 tons on the same date a year ago. May receipts at Lake Erie ports were 880,278 tons as compared with 1,645,534 tons during May last year. May shipments from these docks were 1,037,124 tons as compared with 1,435,748 tons during May of last year.

The new prices for ore delivered lower lake ports are: Old range Bessemer, 55 per cent iron, \$5.95 old range non-Bessemer, 51½ per cent iron, \$5.20; Mesabi Bessemer, 55 per cent iron, \$5.70; Mesabi non-Bessemer, 51½ per cent iron, \$5.05.

Railroad Rates on Ore Reduced

Northern railroads have made a 10 per cent reduction in rates on iron ore from the mines to the upper lake docks. Following a request by the Interstate Commerce Commission that the railroads make the reduction voluntarily, the two Steel Corporation railroads announced the rate cut, effective July 1. Saturday the Interstate Commerce Commission issued a formal order instructing the railroads to make the rate cuts. The same day an announcement was made that the Northern Pacific and Great Northern railroads had made the reductions on ore to become effective July 1. Monday the Northwestern Railroad announced a 10 per cent reduction to become effective June 19. This leaves two railroads, the Chicago, Milwaukee & St. Paul and the Soo Line to be heard from, but in view of the Interstate Commerce Commission's order, rate cuts by those lines will be made. These rate reductions mean a cut of 10c. per ton on the haulage charge from the mines for a very large percentage of the ore, as the present freight rate is \$1 per ton except from the Marquette range to Marquette. From the eastern Marquette range it is now 75c. and from the western Marquette range to Marquette 85c. per ton. Efforts are being made to have the railroads place the reduced rates in effect by June 20 and these may be successful. The handling charge on direct ore from the hold to the rail of the vessel, which is borne by the shipper, has been reduced from

14c. to 13c. per ton. The shipper is also saving about 5.40c. per ton by the elimination of the Federal transportation tax on Jan. 1. These charges, together with the 10c. a ton reduction on vessel rates, make a reduction in costs for the shipper of approximately 27c. per ton. The line haul charge for handling ore from the rail of the vessel to the car, which is borne by the consumer, has been reduced from 8½c. to 8c. per ton. On dock ore the charge per ton for handling from the rail to the vessel to the dock has been reduced from 22½c. to 20c.; the charge for handling to the dock stock pile to the car from 14c. to 13c. and the dock storage from 1½c. to 1c. per ton per month. These dock charges are borne by the consumer.

Ore shippers have received copies of the new railroad tariffs on ore from Lake Erie docks to interior furnaces which will become effective June 15, together with the reductions in dock handling charges. The new rates, the present rates and the rates from 1917 to Aug. 26, 1920, are as follows:

	New Rate	Present Rate	Rate Previous to Aug. 26, 1920
Valley	\$0.82	\$0.91	\$0.65
Dover, Leetonia and New Castle..	0.88	0.98	0.70
Midland, Pa.	1.00	1.105	0.79
Pittsburgh	1.15	1.275	0.91
Johnstown	1.30	1.44	1.03
Jackson and Hamilton from Toledo	0.90	1.00	0.715
Jackson from Cleveland.....	1.12	1.245	0.89
Ironton	1.25	1.385	0.99
Lehigh and Schuylkill Valleys.....	1.94	2.155	1.54
Sparrows Point	2.00	2.225	1.59

Prices of Lake Superior Iron Ore, 1890 to 1922

Season	Old Range		Mesabi		Old Range		Mesabi	
	Bessemer	Bessemer	Bessemer	Bessemer	Non-Bessemer	Non-Bessemer	Non-Bessemer	Non-Bessemer
1922	\$5.95	\$5.70	\$5.20	\$5.05				
1921	6.45	6.20	5.70	5.55				
1920	7.45	7.20	6.70	6.55				
1919	6.45	6.20	5.70	5.55				
*1918—To July 1.....	5.95	5.70	5.20	5.05				
July 1 to Oct. 1	6.40	6.15	5.65	5.50				
From Oct. 1.....	6.65	6.40	5.90	5.75				
1917	5.95	5.70	5.20	5.05				
1916	4.45	4.20	3.70	3.55				
1915	3.75	3.45	3.00	2.80				
1914	3.75	3.50	3.00	2.85				
1913	4.40	4.15	3.60	3.40				
1912	3.75	3.50	3.00	2.85				
1911	4.50	4.25	3.70	3.50				
1910	5.00	4.75	4.20	4.00				
1909	4.50	4.25	3.70	3.50				
1908	4.50	4.25	3.70	3.50				
1907	5.00	4.75	4.20	4.00				
1906	4.25	4.00	3.70	3.50				
1905	3.75	3.50	3.20	3.00				
1904	3.25	3.00	2.75	2.50				
1903	4.50	4.00	3.60	3.20				
1902	4.25	3.25	3.25	2.75				
1901	4.25	3.25	3.00	2.75				
1900	5.50	4.50	4.25	4.00				
1899	3.00	2.40	2.15	2.00				
1898	2.75	2.25	1.85	1.75				
1897	2.60	2.25	2.15	1.90				
1896	4.00	3.50	2.70	2.25				
1895	2.90	2.19	2.25	1.95				
1894	2.75	2.35	2.50	no sale				
1893	3.85	3.00	3.20	no sale				
1892	4.50	no sale	3.65	no sale				
1891	4.50	no sale	4.25	no sale				
1890	5.50	no sale	5.25	no sale				

*Prices for 1918 established by the Government.

Action of the Interstate Commerce Commission

WASHINGTON, June 13.—A supplemental report of the Interstate Commerce Commission of last Saturday reduced freight rates from upper mines to Lake Superior docks by 10 per cent, so as to place them on a relative parity with reduced rates ordered on lower lake and Eastern ore. Consumers had been urging a reduction of the upper lake rates since the general rate decision which reduced the rates on all other domestic shipments of ore and had been awaiting the supple-

mental decision before entering into 1922 contracts. The reduced rates on lower lake and Eastern ore shipments will become effective on Thursday of the current week as the result of the order of the commission giving the railroads special permission last week to put the lower rates into effect upon five days' notice. Tariffs carrying the reduced rates on these shipments now have been filed with the commission. The supplemental decision lowering upper lake rates provides that they shall become effective on or before July 1 and it is believed that the railroads will ask they become operative on short notice also. It will be possible to apply the new upper lake rates upon three days' notice in view of the action of the commission granting special permission to put all of the reduced rates covered in the general decision into operation upon three days' notice. This order followed the announcement by the railroads late last week that it would be physically impossible to prepare tariffs covering all of the reduced rates upon 10 days' notice previous to July 1 as provided in the general decision. It is likely that most of the reduced rates will not be made effective before July 1, but those on upper lake ore, the trade hopes, will be made effective at an early date by reason of the fact that reduced lower lake and Eastern ore rates will be applied beginning with Thursday of the present week.

The new rates from the mines to Lake Superior docks will be 90c., 77c., and 68c. per gross ton. The rates will not provide any fractions, the rule of the commission in its general decision calling for the application of the next whole cent where the fraction is one-half or more and for the dropping of the cent where the fraction is less than one-half cent.

The old and new rates from the mines to the upper docks are as follows:

Group 1:	Old Rate	New Rate
From Mesabi and Vermillion ranges via Duluth & Iron Range, Duluth, Missabe & Northern and Great Northern railroads to		
Two Harbors, Minn.	\$1	90c.
Duluth, Minn.	1	90c.
West Superior, Wis.	1	90c.
Group 2:		
From Cuyuna range via Soo Line and North Pacific Railroad to		
West Superior, Wis.	1	90c.
Superior, Wis.	1	90c.
Duluth, Minn.	1	90c.
Group 3:		
From Gogebic, Menominee and Marquette (Swanzy) ranges via Chicago & Northwestern, Chicago, Milwaukee & St. Paul and Soo Line to		
Ashland, Wis.	1	90c.
Escanaba, Mich.	1	90c.
Group 4:		
From Gwin and Republic districts on Marquette range via Duluth, South Shore & Atlantic, Lake Superior & Ishpeming and Nunsing, Marquette & Southeastern to		
Marquette, Mich.	85c.	77c.
Presque Isle, Mich.	85c.	77c.
Group 5:		
From Ishpeming and Negaunee districts on the Marquette range via same lines as in Group 4 to		
Marquette	75c.	68c.
Presque Isle	75c.	68c.

The supplemental decision applying to upper lake rates was rendered so as to round out the general decision because the latter made reductions only on those rates which had not been reduced by or since the general 40 per cent rate advance of Aug. 26, 1920, and upper lake rates were not increased at that time. It is assumed from the supplemental decision that the 10 per cent reduction applies also to loading, and handling charges inasmuch as a cut of this character was made in connection with lower lake charges and by reason of the final statement in the supplemental decision. This statement says: "The findings and authorizations of the original report herein are applicable in all other respects," meaning in addition to the 10 per cent cut in line haul rates. Commissioner Hall dissented from the supplemental decision.

The new lower lake rates and charges are well known to the trade, but a typical example may be cited. The new rail rate on direct ore from Lorain, Ohio, to

Allegheny, Pa., will be \$1.15, while the new charge for loading from the vessel to the car will be 8c. per gross ton, making a total of \$1.23. On dock ore, the charge for loading from the vessel to the dock will be 20c., and from the dock to the car, 13c., which with the line haul rate of \$1.15 makes a total of \$1.48 per gross ton, or a difference of 25c. over the direct ore charges.

Standard International Corporation Will Operate in Mexico

Goethals, Wilford & Boyd, Inc., 150 Nassau Street, New York, in which William Goethals & Co., 40 Wall Street, hold a controlling interest, and which has been engaged in a general export business for several years, has changed its name to the Standard International Corporation and following an increase in capital stock, shares will be held by the General Electric Co., Worthington Pump & Machinery Corporation, McClintic-Marshall Co., Austin Machinery Co., Lucas Paint Co., Standard Supply & Equipment Co., United Alloy Steel Corporation, Warren Axe & Tool Co. and probably three other companies, which will be named later. The object of the new company is to represent in Mexico the interests of the companies holding its stock, but its activities will not in any way infringe on the present export offices and activities of the concerns mentioned, such as the Mexican office of the International General Electric Co. The new company's work will be confined at first to representation in Mexico, with headquarters in Mexico City and the maintenance of the offices established by Goethals, Wilford & Boyd, at San Juan, Porto Rico and Colon, Panama, with a bonded warehouse in Panama.

George W. Goethals, who is president of Goethals, Wilford & Boyd, Inc., becomes chairman of the board of directors of the Standard International Corporation, and Ignacio de la Barra, formerly director general of the National Railways of Mexico under the administration of President Diaz, will be president. William Y. Boyd, vice-president of the former company, becomes vice-president and general manager of the company and will open headquarters in Mexico City in July. The new company, it is stated, will be controlled by the companies holding stock, which will be represented on the board of directors by one director each in addition to William Y. Boyd, Ignacio de la Barra, C. C. Jamieson and R. E. Graham, the latter two members of George W. Goethals & Co. and former directors of Goethals, Wilford & Boyd; Winthrop Sargent, Jr., president, Standard Supply & Equipment Co. and William P. Barba, chairman of the board, Standard Supply & Equipment Co., who was formerly vice-president and general manager of the Midvale Steel & Ordnance Co.

In a statement, the new company says: "In Mexico, where the immediate efforts of the Standard will be applied, there is considerable reconstruction about to be undertaken involving the financing of several hundreds of millions of dollars, according to estimates made by engineers and bankers, for supplies and equipment alone. It is certain that the combined efforts of such a group of American manufacturers, all non-competing and in close co-operation with whatever policy is determined upon by the bankers, will be able to secure for the United States its share of business." The statement further points out that similar combinations have been formed by European companies.

The Electric Furnace Co., Salem, Ohio, has recently taken an order from the Japanese Government for a 180 kw. furnace with a capacity of 1/4-ton per hour for heat treating shells. Another recent order is for a 105-kw. brass melting furnace from the American Bushing Co., Port Huron, Mich. This will be a continuous pusher type for heating bushings for forgings. The company has recently shipped a 125-kw. furnace to the Pettibone Milliken Co., Chicago, for melting ferromanganese and a 75-kw. furnace to the American Hardware Co., New Britain, Conn., for brass melting, a 50-kw. furnace for the Best Foundry Co., Bedford, Ohio, for brass melting and a 200-kw. aluminum melting furnace for the United Aluminum Co., of Germany.

Senate Amends Metal Schedule Rates

Numerous Changes Agreed Upon—Discussion Not Always
Partisan—Senator Underwood's Sharp
Criticism

BY L. W. MOFFETT

WASHINGTON, June 13.—Entering upon its third week of discussion of the metal schedule in the tariff, the Senate yesterday agreed to a duty of 1½c. per lb. on ferromanganese containing more than 1 per cent of carbon, instead of the proposed duty of \$2.50 per ton originally reported by the committee on finance and a duty of 2 1/5c. per lb. carried in the House bill. On ferromanganese and spiegeleisen containing not more than 1 per cent of carbon, the Senate agreed to a duty of 1½c. per lb. and 15 per cent ad valorem. The Senate retained its provision that these duties are to be applied to the manganese metallic content beginning with 30 per cent manganese. The specific duty on ferromanganese was considered as compensatory for the duty of 1c. per lb. (of manganese content) on manganese ore, while the ad valorem rate was held to be a protective rate figured on a loss of 29 per cent metallic manganese in converting into ferromanganese.

The Finance Committee withdrew its proposed duty of 75c. per lb. on molybdenum ore and substituted a rate of 35c. and reduced the compensatory duty on ferromolybdenum from its proposed duty of \$1.25 per lb. on molybdenum content and 15 per cent ad valorem to 50c. per lb., retaining the same ad valorem rate as a protective duty.

The revised duties were agreed to by the Senate. Duties on tungsten and ferrotungsten were passed over temporarily at the suggestion of Senator Smoot, member of the Finance Committee, after Senators Willis and Pomerene of Ohio pointed out complaints of makers of high-speed tool steel that rates on their raw products are too high and exceed those on finished products.

May Write New Paragraph

Senator Smoot said a new paragraph may have to be written to cover tungsten ore, ferrotungsten and tool steel. The Senate agreed to the committee's duties on ferrosilicon up to 80 per cent or more, but Senator Willis gave notice that later he will ask that the minimum content of 8 per cent be reduced to 7 per cent. It is likely that the Senate will strike out ferrosilicon in excess of 80 per cent for which there is no commercial market. The Senate also agreed to the Finance Committee's reduction from 30 to 25 per cent on ferrochrome, chrome metal, titanium, chromium nickel, vanadium and ferrovanadium and in alloy steel. Paragraph 305 reduced the cumulative duty from \$1.25 to 65c. per lb. on molybdenum content in excess of 6/10 of 1 per cent on tool steel, but retained the duty of 72c. per lb. on the tungsten content in excess of 6/10 of 1 per cent. These duties may be changed again, however.

Sharp Discussion

The discussion on ferroalloy and tool steel duties was prolonged and sharp at times. It was not entirely of a partisan character, some of the Western senators upholding the increased duties on ferromanganese and on ores used in making tool steel. Senator Underwood, Democrat, of Alabama, made a vigorous attack on the Senate for adopting duties on raw materials, particularly manganese ore, and said the duty on the latter is no more justified than a duty on either coal or iron ore, which, he said, have been properly left on the free list. He said that the iron and steel industry has become a giant, able to compete in the world's markets, but that the Senate is proceeding to put it back in "swaddling clothes" in taxing its raw materials.

While the Senate has finally disposed of the greater portion of the items in the metal schedule, there are still some of a very contentious nature that remain to be discussed. The general tendency of the Senate is

to reduce the rates in the metal schedule reported by the Committee on Finance and in practically all instances this is due to recession of the committee itself on the rates it proposed. There are, of course, notable exceptions to this policy, as for instance, in the case of manganese ore which was given the House duty instead of being left on the free list. Perhaps the most important change in the metal schedule made during the past week was the reduction of the duty on machine tools from 35 per cent to 15 per cent. This was done at the suggestion of Senator Robinson, Democrat, of Arkansas. This item is carried in paragraph 372, which also was changed in other respects. The House duty of 15 per cent on steam engines and steam locomotives was restored at the suggestion of Senator Smoot, a member of the committee, who asked that the Senate duty of 20 per cent be rejected. The committee also changed the rate on printing presses not specifically provided for, and lawn mowers, which were made dutiable at 35 per cent. By this action these items now go into the basket clause, taking the Senate rate of 30 per cent and the House rate of 35 per cent.

Considerable discussion has been given by the Senate to duties on cutlery and at times it became heated. Some of the duties reported by the Senate, which admittedly are high, owing to the fear of competition of low-priced German cutlery, were retained, although there were numerous changes, principally downward.

Numerous Amendments

Other important items disposed of during the past week were the following:

Woven wire cloth (318) House duty of 20 per cent restored in place of proposed committee duty of 20 per cent on meshes not finer than 30 wires to the lineal inch in warp or filling; House duty of 30 per cent also restored in place of Senate committee duty of 40 per cent on meshes finer than 30 and not finer than 90 wires, and Senate committee duty of 45 per cent retained on meshes finer than 90 wires; duty on tacks and brads, hobnails, and cut nails not exceeding 2 in. in length reduced from proposed Senate Committee duty of 30 per cent to 15 per cent, and duty on horseshoe nails and other nails not specifically provided, reduced from 2½c. to 1½c. per pound (331); card clothing (337) paragraph divided so as to give material made of round iron or untempered round steel wire a duty of 20 per cent, while that made with tempered round steel wire retains the duty of 45 per cent which the committee originally named for all card clothing; wood screws (338) given an ad valorem duty of 25 per cent instead of proposed specific duties, action of the Senate reinstating the present Underwood-Simmons duty; fish hooks, etc. (344), with duty of 45 per cent, agreed to; penknives, pocketknives, etc. (354), valued at more than \$6 per dozen, given a duty of 40c. each and 60 per cent instead of original committee proposal of 50c. each and 60 per cent; table, butchers', carving, cooks' knives, etc. (355), given flat ad valorem duty of 45 per cent instead of proposed graduated specific duties; planing machine knives, etc. (356), duty reduced from 45 per cent to 20 per cent; precision or Swiss pattern styles (362) House provisions restored in place of proposed Senate committee duty of 50 per cent; shot guns, pistols, rifles, etc. (364) (365), Senate committee duties agreed to; watch movements (367), clocks and clock movements (368), Senate committee duties agreed to; automobiles, etc. (369), House duty of 25 per cent approved by Senate committee agreed to, but dissent on proposed countervailing duty determined upon; airplanes, motor boats, etc. (370), House duty of 30 per cent approved by Senate committee agreed to; bicycles (371), proposed Senate committee duty of 45 per cent reduced to 30 per cent; cream separators and other centrifugal machines for the separation of liquids inserted in machine tool paragraph (372) and given duty of 25 per cent; aluminum scrap and alloys in which aluminum is the component material of chief value, in crude form, House committee duty of 5c. per lb. retained; aluminum in coils, latter word being inserted by Senate committee, plates, sheets, bars, rods, etc., House duty of 9c. per lb. retained.

Iron and Steel Markets

MILLS MORE CONGESTED

Greater Pressure for Steel, Though Output Grows

Fuel Uncertainty Adds to the Tension with Some Prices Higher

Steel output is still growing, though but slightly, and demand for delivery in the near future continues on a scale that puts increasing pressure upon the mills. This, with rising fuel costs and the prospect of higher labor, has caused advances in a number of steel products.

No decisive gain has been made in coal production, but the net change is on that side, a Pittsburgh steel company having been able to start 100 coke ovens, while the Steel Corporation's by-product coke plants have increased their output somewhat.

The high point to which steel works operations have been pushed, in the face of the coal strike, is a weekly marvel. For the past week the Steel Corporation has exceeded 75 per cent, reaching 80 per cent in the Pittsburgh and nearby districts, and the independent output might be close to 75 per cent but for a number of Eastern mills.

More is heard of the allocation of mill output of certain finished products on which producers appear to be falling further behind. The uncertainties of the fuel situation, as accumulated stocks are drawn upon, make steel companies less willing to promise the deliveries wanted. This reacts on buyers and some become more urgent.

Additions to the list of active blast furnaces include one Illinois Steel Co. stack, and at New Castle, Pa., the Carnegie Steel Co. is about to blow in one and possibly two furnaces. A merchant furnace at Duluth and one at Milwaukee are scheduled for early resumption.

Demand for soft steel bars is most pronounced. Chicago district mills are sold up far ahead and Eastern mills are getting more business there at 1.70c., Pittsburgh, and higher.

For delivery at mill convenience 1.60c., Pittsburgh, is now a minimum for bars, plates and shapes. On bars and shapes 1.70c. to 1.80c. represents the market for early shipment.

Attempts to advance blue annealed sheets have succeeded only in part. Some mills lately asking 2.60c. and higher are now meeting the Steel Corporation price of 2.40c.

Of 14,000 tons of fabricated steel work contracted for in the week, a new open-hearth plant of the Wisconsin Steel Works accounts for nearly one-half the tonnage. New projects appearing total 27,500 tons, including 16,000 tons for 65 tanks for the Sinclair Oil Co.

Large contracts for tin plate for last half delivery have been placed with all the leading mills at \$4.75 per base box. Steel Corporation mills are run-

ning at 80 per cent of capacity and the independent rate is but little less. Nearly double the 1921 output is expected.

The upward tendency in iron and steel works wages is seen in the advance from \$5.50 to \$6 in the base puddling rate to which employers have just agreed in the settlement of the iron rolling mill scale. The new rate dates from July 1.

The 1922 price for Lake Superior iron ore, as established by an initial sale of 175,000 tons on June 9, is 50 cents per ton lower than that of 1921. Mesabi non-Bessemer ore, which last year was \$5.55 base, is now \$5.05. At Lake Erie port the real reduction by iron mining companies is 23 cents, freight and dock charges having come down 27 cents per ton.

Sales of pig iron aggregating over 25,000 tons, mostly in small lots, were made in Cleveland, with many like sales in other market centers, but the week has seen no large transactions. Although some Southern furnaces are quoting \$20, Birmingham, they have virtually retired from the market and iron can be had at \$18.50, with some resales at \$18. Quotations in the Philadelphia market have advanced about 50c. on foundry grades.

German and Japanese works shared equally on the latest rail purchase for Japan, 6600 tons in all. Export bookings of steel have fallen off compared with those of a few months ago. Current business is coming now largely from South America.

Low British prices to the United States on pig iron have gone unaccepted. Sales of Continental steel are increasing. Belgium has sold 15,000 tons of rails to Finland.

Pittsburgh

Coal and Coke Shortage Causes Anxiety—Strong Price Situation

PITTSBURGH, June 13.—Apprehension is growing among the steel mills in regard to future supply of coal, and the disposition not to sell semi-finished and finished steel products beyond July delivery is getting stronger, most steel and finishing mills in this district preferring to await developments in the coal strike before taking further commitments beyond July. This has created a strong desire on the part of consumers to cover ahead, and also to get shipments of material on contracts already placed. The natural effect of all this is to greatly strengthen prices, which are very firm, with indications of going higher on some steel products. There seems to be a growing scarcity in nearly all kinds of semi-finished and finished steel, and this is also strengthening prices.

During the week, there were advances in prices on nuts and bolts and rivets, and one interest advanced railroad spikes \$2 per ton. Plates, structural shapes and steel bars are perhaps leaders in strength in the market. For early delivery bars were established at 1.70c. the first week in June and plates and shapes may reach that figure at an early date. Reports of an early advance in prices on iron and steel pipe are not correct, having been denied by several leading makers. Operations of the steel mills continue on about a 75 per cent basis, and for the Steel Corporation close to 80 per cent.

The Carnegie Steel Co. will start one, and possibly two, blast furnaces in the New Castle, Pa., district this week. No. 1 stack of the Pittsburgh Steel Co. started

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	June 13, 1922	June 6, 1922	May 16, 1922	June 14, 1921
No. 2X, Philadelphia...	\$26.82	\$26.26	\$26.26	\$25.50
No. 2, Valley furnace...	24.00	24.00	24.00	22.50
No. 2, Southern, Cin'ti...	23.00	23.00	22.00	26.50
No. 2, Birmingham, Ala...	18.50	18.50	17.50	22.00
No. 2 foundry, Chicago*	23.00	23.00	23.00	21.00
Basic, del'd, eastern Pa...	25.00	25.00	23.50	25.00
Basic, Valley furnace...	25.00	25.00	25.00	21.00
Valley Bess., del. Pitts...	26.96	26.96	26.96	24.96
Malleable, Chicago*	23.00	23.00	23.00	21.00
Malleable, Valley	24.50	24.50	24.50	23.00
Gray forge, Pittsburgh...	25.46	25.46	25.46	23.46
L. S. charcoal, Chicago...	29.00	29.00	28.00	37.50
Ferromanganese, seab'd...	67.50	67.50	65.00	75.00

Rails, Billets, etc., Per Gross Ton:	June 13, 1922	June 6, 1922	May 16, 1922	June 14, 1921
O.-h. rails, heavy, at mill...	\$40.00	\$40.00	\$40.00	\$47.00
B.s.s. billets, Pittsburgh...	35.00	35.00	35.00	37.00
O.-h. billets, Pittsburgh...	35.00	35.00	35.00	37.00
O.-h. sheet bars, P'gh...	35.00	35.00	35.00	39.00
Forging billets, base, P'gh	40.00	40.00	37.00	42.00
O.-h. billets, Phila...	40.74	40.74	38.74	42.74
Wire rods, Pittsburgh...	38.00	38.00	38.00	48.00
Skelp, gr. steel, P'gh, lb...	1.70	1.70	1.60	2.20
Light rails at mill...	1.50	1.50	1.50	2.20

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	1.96	1.96	1.96	2.25
Iron bars, Chicago...	1.75	1.70	1.65	2.25
Steel bars, Pittsburgh...	1.70	1.70	1.60	2.10
Steel bars, Chicago...	1.75	1.75	1.65	2.48
Steel bars, New York...	1.98	1.98	1.88	2.48
Tank plates, Pittsburgh...	1.60	1.60	1.60	2.00
Tank plates, Chicago...	1.75	1.75	1.65	2.38
Tank plates, New York...	1.98	1.98	1.98	2.38
Beams, Pittsburgh	1.60	1.60	1.60	2.20
Beams, Chicago	1.75	1.75	1.65	2.58
Beams, New York	1.98	1.98	1.98	2.58
Steel hoops, Pittsburgh...	2.40	2.40	2.25	2.75

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire, June 13, 1922	June 6, 1922	May 16, 1922	June 14, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents
Sheets black, No. 28, P'gh	3.15	3.15	3.15
Sheets, galv., No. 28, P'gh	4.15	4.15	4.15
Sheets, blue an'l'd. 9 & 10	2.40	2.40	2.40
Wire nails, Pittsburgh...	2.40	2.40	2.40
Plain wire, Pittsburgh...	2.25	2.25	2.25
Barbed wire, galv., P'gh...	3.05	3.05	3.85
Tin plate, 100-lb. box, P'gh	\$4.75	\$4.75	\$6.25

Old Material, Per Gross Ton:	June 13, 1922	June 6, 1922	May 16, 1922	June 14, 1921
Carwheels, Chicago	\$18.25	\$18.25	\$18.50	\$13.25
Carwheels, Philadelphia...	17.00	17.00	17.00	18.00
Heavy steel scrap, P'gh...	17.00	17.00	17.00	13.00
Heavy steel scrap, Phila...	15.00	15.00	14.75	11.50
Heavy steel scrap, Ch'go...	14.50	14.50	15.00	11.00
No. 1 cast, Pittsburgh...	18.50	18.50	18.50	17.00
No. 1 cast, Philadelphia...	19.00	19.00	18.50	17.50
No. 1 cast, Ch'go (net ton)	16.00	16.00	16.25	13.00
No. 1 RR. wrot, Phila...	17.00	17.00	17.00	15.00
No. 1 RR. wrot, Ch'go (net)	12.50	12.50	13.00	9.50

Coke, Connellsville, Per Net Ton at Oven:	June 13, 1922	June 6, 1922	May 16, 1922	June 14, 1921
Furnace coke, prompt...	\$6.50	\$6.50	\$6.00	\$3.00
Foundry coke, prompt...	7.00	7.00	6.50	4.50

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	14.00	14.00	13.25	13.00
Electrolytic copper, refinery	13.75	13.75	13.00	13.00
Zinc, St. Louis	5.42 1/2	5.32 1/2	5.12 1/2	4.45
Zinc, New York	5.77 1/2	5.67 1/2	5.47 1/2	4.95
Lead, St. Louis	5.00	5.50	5.20	4.25
Lead, New York	5.90	5.80	5.40	4.50
Tin (Straits), New York...	31.00	32.50	30.75	29.25
Antimony (Asiatic), N. Y.	5.25	5.25	5.37 1/2	5.20

Composite Price, June 13, 1922, Finished Steel, 2.141c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	June 6, 1922, 2.141c. May 16, 1922, 2.127c. June 14, 1921, 2.679c. 10-year pre-war average, 1.689c.
These products constitute 88 per cent of the United States output of finished steel	

Composite Price, June 13, 1922, Pig Iron, \$23.89 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	June 6, 1922, \$23.79 May 16, 1922, 23.63 June 14, 1921, 21.92 10-year pre-war average, 15.72
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last week. The situation is growing more tense as to supply of steel, and deliveries by the mills are unsatisfactory.

Pig Iron.—The local market is extremely quiet, sales being confined mostly to car load lots. A local company is credited with having bought 1000 tons of standard Bessemer iron at slightly under \$25, Valley, but it is claimed this was resale iron. Both Bessemer and basic iron are extremely scarce, and one leading producer states it would be very hard to pick up any in the open market. Small sales of No. 2 foundry are reported to have been made at \$24, Valley furnace. The reduction of 50c. a ton in prices of ore will not be a real factor in costs for some time, as nearly all the furnaces have considerable ore in their yards and at docks, bought at last year's prices which they will use before they can avail themselves of the lower price just announced. The market remains very strong, with a decided scarcity in all grades of iron.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic	\$25.00
Bessemer	25.00
Gray forge	\$23.50 to 24.50
No. 2 foundry	24.00 to 25.00
No. 3 foundry	23.50 to 24.50
Malleable	24.50

Iron and Steel Bars.—Prices being quoted by makers of steel bars vary as much as \$3 per ton. The Carnegie Steel Co. is still quoting 1.60c. to favored customers. Independent mills usually ask 1.70c., and a few as high as 1.75c. Mills do not seem anxious to put more orders on their books on account of the uncertainty of fuel supplies and in some cases quote a price so high that they know the buyer will not take it. The markets on both iron and steel bars are very strong, the available supply is limited, and higher prices may be forthcoming before very long. The advance of 50c. per ton granted to puddlers in the conference at Youngstown, Ohio, will add still more to the cost of making bar iron after July 1.

We quote steel bars rolled from billets at 1.60c. to 1.75c.; reinforcing bars, rolled from billets, 1.60c. to 1.75c. base; reinforcing bars, rolled from old rails, 1.50c.; refined iron bars, 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Ferroalloys.—A very limited amount of ferromanganese is available for prompt delivery and the local market is strong, with indications that prices may be higher before long. Consumers are not getting prompt deliveries on ferromanganese bought some time ago, and several small lots shipped out of stock recently brought \$70, or \$2.50 per ton higher than the regular

market. English ferromanganese seems to have an advantage in the market just now, as domestic is very hard to obtain. Sales have been made in this market in the past week of over 1000 tons, all at \$67.50, seaboard. It is intimated that the English producers are taking advantage of the present situation and may advance prices shortly. The market on spiegeleisen is much the same as on ferromanganese, the available supply for prompt delivery being small and prices firm. There is no change in the market in Bessemer ferrosilicon and silvery iron, prices being firm.

We quote 78 to 82 per cent ferromanganese, \$67.50 c.i.f. Atlantic seaboard for domestic and \$67.50 for English. Average 20 per cent spiegeleisen, \$36 furnace; 16 to 19 per cent, \$35 furnace; 50 per cent ferrosilicon, domestic, \$55 to \$60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$41.50; 11 per cent, \$44.80; 12 per cent, \$48.10; 13 per cent, \$52.10; 14 per cent, \$55.10; silvery iron, 6 per cent, \$30; 7 per cent, \$31; 8 per cent, \$32.50; 9 per cent, \$34.50; 10 per cent, \$36.50; 11 per cent, \$39; 12 per cent, \$40.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$1.06 per gross ton.

Structural Material.—Awards of contracts in this district in the past week were few, and only for small jobs. Fabricating shops report they are busy, their chief trouble being to get material promptly. Deliveries are slow, owing to the coal strike, and also to the fact that fabricators that have contracts placed are urging prompt shipments, and the mills are dividing their tonnage as best they can. Prices on plain material are firm, and it is intimated that the 1.60c. price will soon disappear, and the market advance to 1.70c. It is stated one local maker has lately taken several orders for shapes for fairly prompt delivery at 1.65c. at mill. Prices are given on page 1701.

Hot-Rolled Flats.—Local makers report their order books well filled up and are firm in their idea as to prices. The minimum on hot-rolled flats is 2.40c. base, Pittsburgh, for delivery in third quarter, and on narrower widths 2.50c. to 2.60c. is being quoted. The leading interest is said to be still quoting flats at 2.25c. base, but has a very limited tonnage and only for regular customers. No definite word has gone out as to the opening of the cotton tie season, but it will probably be next month.

Plates.—The demand for plates is only fairly active, but the mills are comfortably filled and do not seem anxious to take on new business except at prices that are satisfactory. In some cases, as high as 1.75c. has been quoted on sheared plates of tank quality, but the actual market is from \$1 to \$2 per ton under that figure.

We quote sheared plates, $\frac{1}{4}$ in. and heavier, tank quality, at 1.60c. to 1.75c., f.o.b. Pittsburgh.

Tin Plate.—Heavy contracts for tin plate have been placed with the leading interest and with independent makers as well, for delivery over last half of the year, at the price of \$4.75 per base box, Pittsburgh, as fixed early in this month. With the growing costs of making tin plate, the uncertainty as to supply of coal unless the strike is settled would indicate that \$4.75 price is practically certain to hold. Output of tin plate continues heavy, the American Sheet & Tinplate Co. operating this week to 80 per cent or more of capacity, and the independent mills very close to this figure. Consumption of tin plate this year will, it is estimated, be nearly double that of last year with prices more satisfactory.

Sheets.—Some independent mills have not committed themselves to any great extent on contracts for sheets for delivery beyond July, but others have sold over the entire third quarter on the basis of 3.30c. for No. 28 black, and 4.30c. for No. 28 galvanized. It is understood the American Sheet & Tin Plate Co. has booked a goodly number of orders for sheets for July delivery at 3.15c. for No. 28 black and 4.15c. for No. 28 galvanized. What this company will do on business for August and September shipments depends largely on the outcome of the coal strike and on other general conditions. Output of sheets is heavy, but consumers are specifying freely against contracts and there is no accumulation. Independent mills are running at about 75 per cent of capacity and the American Sheet & Tin Plate Co. is close to 90 per cent. There is some complaint from independent

mills about slow delivery of sheet bars from their sources of supply. This is keeping down output to some extent. A slight shortage in skilled labor has also developed in one or two sections where large sheet mills are located. Prices in effect are given on page 1701.

Fluorspar.—Local sellers of this material report a very active market and prices are firm. We quote \$16 to \$17.50. Sales of fluorspar have been made in this market in the past week, mainly for shipment from Kentucky and Illinois mines to steel plants located at Eastern seaboard.

Wire Products.—The demand for wire nails of the more commonly used sizes, and also for wire of all kinds, is very active, and jobbers and other large consumers say they are having trouble in getting prompt deliveries from the mills. Two local interests say their order books are about filled as far ahead as they care to sell, and they are quoting only to favored regular customers. Prices on wire nails, wire and woven fence wire are given on page 1701.

Rivets.—Effective from June 7, the Pittsburgh Screw & Bolt Co., the Townsend Co., New Brighton, Pa., and nearly all manufacturers have made an advance of \$3 per ton on large rivets and also a material advance in prices on small rivets. The demand for rivets for some time has been active, and the makers have been confronted with higher costs of manufacturing, due to the coal strike, and other causes, which they say fully justify them in making this recent advance. The new prices on boiler and structural rivets, and the new discount on small rivets, are given on page 1701.

Steel Skelp.—Pipe mills that buy skelp in the open market report that the available supply is limited, especially on narrow grooved sizes. Skelp makers quote 1.60c. to 1.65c. for sheared and 1.70c. to 1.75c. for grooved, but on narrow sizes of grooved, 1.90c. to 2c. has been quoted.

Wire Rods.—A leading local maker is still quoting soft Bessemer and open-hearth rods at \$38, but intimates this price is made only to some customers, and says that the price may be \$40 within a week or two. The demand for rods is active, and the available supply, over and above makers' needs, is light. The fact is referred to that costs of making rods have gone up very much lately, due to higher prices for coal, and to higher labor charges.

We quote No. 5 common basic or Bessemer rods \$38, chain rods \$38, screw stock rods \$43; rivet and bolt rods and other rods of that character, \$38. High carbon rods, \$45 to \$48, depending on carbons, per gross ton, f.o.b. Pittsburgh or Youngstown.

Billets, Sheet Bars and Slabs.—Steel works that have billets or sheet bars to spare are confining their sales for delivery not later than July, refusing to sell beyond that month on account of uncertainty of coal supplies. Consumers are pretty well covered on billets and bars, but complain of slow deliveries by the mills. Prices are firm, with not very much new tonnage being bought in the open market.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at \$35; 2 x 2-in. billets, \$35; Bessemer and open-hearth sheet bars, \$35; slabs, \$35; forging billets, ordinary carbons, \$40. all f.o.b. Youngstown or Pittsburgh mills.

Track Equipment.—Effective Monday, June 12, Dilworth, Porter & Co., Inc., this city, large makers of spikes, advanced prices \$2 per ton. The company states that higher prices for coal and other higher manufacturing costs fully justify this advance, and also that at \$2.25 per 100 lb. there was no profit in making spikes. Another local spike maker advises that it will make no changes in its prices for the present. There is a fairly good demand for spikes, made up mostly of small lots, and makers are filled ahead for some time. The recent inquiry of the Baltimore & Ohio Railroad for 5000 kegs of standard spikes is reported to have gone to a leading Philadelphia maker, but the price has not been given out. Track bolts are still quoted at 3c. base in large lots, but the demand is only fair, and in view of this, makers are not inclined to advance this price at present. Tie plates are quoted at \$1.75 to \$2, per 100 lb., prices depending on the

size of the order and the specifications. Prices are given on page 1701.

Iron and Steel Pipe.—Local mills report that the demand for pipe of all kinds, especially for the smaller sizes used in new building construction, is still very heavy. Several mills are using caution in booking orders for pipe, as they have about all the tonnage on their books they care to take, in view of the uncertain future of manufacturing costs, due to the coal strike. Their costs have gone up a good deal lately, and while the pipe makers feel they would be justified in making a general advance in prices, no action of that kind is yet under way. The oil business is reported active, but no large pipe lines are in the market. There is no change in prices, and discounts on iron and steel pipe now in effect, are given on page 1701.

Boiler Tubes.—The demand for welded steel tubes and charcoal iron tubes is active, and prices are firm. Occasionally regular discounts on steel welded tubes are slightly shaded. Discounts in effect on steel and charcoal iron tubes are given on page 1701.

Cold Rolled Strips.—The recent advance to 4c. base, on cold-rolled strips, f.o.b. Pittsburgh, made by the independent makers, is holding firm. The American Steel & Wire Co. is still quoting 3.75c. base to its customers, but is expected to advance its price to 4c. in the near future.

Bolts and Nuts.—Effective June 6, the Graham Bolt & Nut Co., Pittsburgh, advanced its prices on nuts and bolts from 5 to 10 per cent, and another local maker will take the same action within the next two or three days. Delays are had in deliveries of steel bars, and operating conditions at present are conducive to higher manufacturing costs. The demand from the automobile trade is especially heavy. The new discounts on nuts and bolts are given on page 1701.

Cold-Finished Steel Bars and Shafting.—A good part of the present active demand is coming from builders of automobiles, but other consumers are also buying more freely than for some time. The price of 2c. Pittsburgh, on hot-rolled bars is firm, and two leading makers say it does not permit of a fair profit, and they are likely to make another advance in the near future. The recent advance of \$2 per ton on ground shafting is adhered to, and we quote at 2.50c. base, f.o.b. at mill in large lots.

Warehouse Prices.—The recent advance in warehouse prices of \$2 per ton on bars, plates and structural shapes, and \$5 per ton on steel bands, is firmly held, and warehouse business in these products is active.

Coal and Coke.—A settlement of the soft coal strike seems to be as far away now as at any time since it started, but there is a feeling in the trade here that something may happen this week or next week that may terminate the trouble. The demand for such coal as is available is very active, and this is having the effect of running up prices. The available supply of beehive coke is light, four or five of the leading producers of Connellsville coke being closed down, and not making any attempt to start their ovens. Prices on Connellsville coal now range from \$3.75 to \$4 per net ton at oven, the latter price having been paid, it is reported, for several good sized lots. Coal for coke-making purposes now seems to be \$3.50 minimum, and steam coal is ranging from \$3.75 to \$4 per ton at oven. Prices on Southern coal are strong due to the continued heavy demand, and also to the fact that Connellsville coal prices are higher. Kentucky coal is now quoted at \$3.50 to \$3.75, while West Virginia coal ranges from \$3.25 to \$3.50 at mines. The usual quotation on furnace coke is \$6.50 to \$7 and on 72-hr. foundry coke \$7 to \$7.50.

Iron and Steel Scrap.—The local scrap market is quiet, the leading consumers not being in the market, and they have not been for two to three weeks past. Brokers say that consumers are taking out scrap freely on their contracts, but seem to be pretty well covered for the time being. There is more activity in the Youngstown, Ohio, district, the three leading steel companies there being fairly active buyers for the past week or two. The higher prices for pig iron have led steel making concerns to use more scrap, and it

is said one leading steel interest has lately used 50 per cent scrap and 50 per cent pig iron in its open hearths while another is using 55 per cent pig iron and 45 per cent scrap. The general tone of the market is strong, and it is believed if any large consumer came into the market for a large tonnage of heavy steel scrap, the price would very quickly advance. The demand for foundry scrap is only fairly active, and in machine shop turnings, borings and several other grades, there is practically no activity. We have reduced prices slightly on several grades of scrap, which are not in demand, and on which brokers are quoting lower figures.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows per gross ton:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$17.00 to \$17.25
No. 1 cast, cupola size.....	18.50 to 19.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	17.00 to 17.50
Compressed sheet steel.....	15.00 to 15.25
Bundled sheets, sides and ends.....	13.50 to 14.00
Railroad knuckles and couplers.....	18.00 to 18.50
Railroad coil and leaf springs.....	18.00 to 18.50
Low phosphorus standard bloom and billet ends.....	20.00 to 21.00
Low phosphorus plates and other grades.....	19.00 to 20.00
Railroad malleable.....	16.00 to 16.50
Iron car axles.....	26.00 to 27.00
Locomotive axles, steel.....	24.00 to 25.00
Steel car axles.....	17.50 to 18.00
Cast iron wheels.....	17.00 to 17.50
Rolled steel wheels.....	17.50 to 18.00
Machine shop turnings.....	13.25 to 13.75
Sheet bar crop ends.....	18.50 to 19.00
Heavy steel axle turnings.....	15.00 to 15.50
Short shoveling turnings.....	14.25 to 14.50
Heavy breakable cast.....	17.50 to 18.00
Stove plate.....	14.00 to 14.50
Cast iron borings.....	14.00 to 14.50
No. 1 railroad wrought.....	14.50 to 15.00
No. 1 busheling.....	14.00 to 15.00

WILL BUY THOMAS IRON CO.

Bankers Understood to Be Acting for the Reading Iron Co.

The Thomas Iron Co., Hokendauqua, Pa., W. A. Barrows, Jr., president, has notified stockholders that Drexel & Co., bankers of Philadelphia, have agreed to buy the stock of the Thomas Iron Co. at \$50 a share, its par value, provided two-thirds of the stock is deposited within a period of 30 days from June 10, the date the notice was sent out. The stock may be deposited either with Drexel & Co. or with the Easton Trust Co., Easton, Pa. Drexel & Co. are supposedly acting for the Reading Iron Co., Reading, Pa.

Attention is called to the fact in the Thomas Iron Co.'s letter to stockholders that this is an agreement of sale and not an option. The announcement further says that the directors of the company have all agreed to deposit their stock at the price named and stockholders are advised to do the same. "The approval of this transaction," it is stated, "is already assured." There are more than 600 shareholders and a good deal of the stock is held by the descendants of the original owners of the Thomas Iron Co.

The Thomas Iron Co. for many years has been an important factor in the Eastern merchant pig iron trade.

The capital stock of the company is \$2,500,000, divided into 50,000 shares of the par value of \$50 each.

The Reading Iron Co., of which L. E. Thomas is president, is capitalized at \$1,000,000 and operates a plant at Reading, Pa., the principal output of which is wrought iron pipe. It owns and operates the Keystone blast furnace at Reading, Pa., and the Crumwold furnace at Emaus, Pa., which have a combined annual capacity of 162,000 tons, most of which is foundry and forge iron for the company's own use. In addition to its works at Reading and its blast furnace at Emaus, the company operates departments at Danville, Birdsboro, Pottstown and Columbia, Pa. It recently acquired the cut nail manufacturing business of the George B. Lessig Co. at Pottstown, Pa., which gives it a total annual capacity of 200,000 kegs of cut nails. Its other products include muck bar, skelp, charcoal boiler iron, gray iron castings and steel forgings.

Chicago

Positive Indications of Increasing Consumption—Steam Coal Scarce

CHICAGO, June 13.—The unremitting pressure for steel is regarded as an indication of increasing consumption and as a refutation of the assumption that the buying movement has been due principally to the desire of buyers to fortify themselves against a possible shortage during the coal strike. Had the latter belief been founded on fact, it is felt that by this time users would be relaxing their pressure on the mills and would turn their attention to the fabrication of their stocks. Notwithstanding the heavy production schedules which the mills have succeeded in maintaining in the face of the strike, it is becoming increasingly difficult to make deliveries that will satisfy consumers, and in order to put all of them on an equal footing, the allocation of current output is being resorted to.

Already booked deep into third quarter, largely on specific orders rather than on open contracts subject to specifications, local mills are taking new business cautiously, not wishing to commit themselves much further ahead at present prices. This attitude is accounted for by the fact that costs are steadily rising. All producers are finding it necessary to buy increasing quantities of coal on the open market. In fact, owing to the dearth of steam coal, it is feared that they will soon be forced to crush high-priced coking coal for use under boilers. Another important element in costs which cannot be ignored is labor. Not alone in the steel works, but in the foundries and other branches of the metal working industry, a shortage of labor has developed. Thousands of foreign workmen who in the past have done the heavy work of our industrial plants have returned to their native lands and much of our new immigration is not of the type which can be recruited to take their places. In view of these facts, further advances in steel prices are looked for, notwithstanding the recent announcement of a 50c. reduction in Lake Superior ore and a 10 per cent reduction in upper lake ore freights.

Steel mill operations remain unchanged, but the Illinois Steel Co. has blown in its eighth furnace at South Works, giving it a total of 20 active stacks out of 29.

Pig Iron.—The market is quiet, although specifications are still being received in volume. In some cases, in fact, melters have asked furnaces to anticipate shipments, a surprising development in view of impending freight reductions, but indicative of low stocks and increasing consumption. Notwithstanding the coal strike, the tendency is toward increased pig iron production. In addition to the Zenith furnace which is about to go in, the Thomas furnace at Milwaukee is expected to be blown in about the middle of July. The latter stack, which has been idle for about two and a half years, will make malleable and low phosphorus. The second boatload of Lackawanna iron, about 5000 tons of foundry, will arrive in Chicago the latter part of this week. This is the last consignment of the tonnage bought by a leading broker for this market. A number of Southern furnaces have withdrawn from the market and others have advanced to \$20, base, Birmingham, but the Southern product can still be bought at \$18.50. Among recent sales of note may be mentioned 1500 tons of malleable bought by a local company for an Indianapolis plant, 400 tons of foundry purchased by a Beloit melter, and 300 tons of foundry placed by a sewing machine manufacturer. Notable among inquiries is one for 1000 tons of foundry for Duluth delivery.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago.....	\$29.00
Northern coke, No. 1, sil. 2.25 to .75.....	\$23.50 to 24.00
Northern coke, foundry, No. 2, sil. 1.75 to 2.25.....	23.00
Northern high phos.....	23.00
Southern No. 2.....	24.42 to 25.17
Malleable, not over 2.25 sil.....	23.00
Basic.....	23.00
Low phos. Valley furnace, sil. 1 to 2 per cent copper free.....	35.00
Silvery, sil. 8 per cent.....	37.82

Ferroalloys.—A local buyer is inquiring for a round tonnage of 15 per cent ferrosilicon. There are also a few inquiries for ferromanganese pending.

We quote 78 to 82 per cent ferromanganese, \$75.00 to \$80.40, delivered; 50 per cent ferrosilicon, \$55, delivered; spiegeleisen, 18 to 22 per cent, \$46.50 to \$47, delivered.

Bars.—The demand for soft steel bars is the most pronounced of all finished products. All bar mills in this district are operating in full, and the Duluth mills were recently started with a scheduled output of 10,000 tons per month; yet output continues to fall far short of demand. As farm implement makers are expected to buy liberally in July and August for fall and winter requirements, the situation is likely to become more acute rather than easier. Eastern mills continue to increase their sales in this territory, getting from 1.70c. to 1.80c., Pittsburgh, for early delivery. Bar iron business is improving slowly and prices have advanced to 1.75c., Chicago. Rail carbon steel bars are still obtainable at 1.60c., Chicago, but an advance is forecast for next week. One mill is about to go on double turn with a comfortable back log to work against. Implement manufacturers are slowly increasing their purchases of hard steel and by July or August are expected to do some heavy buying. The proposed starting up of the Moline mill of the Republic-Iron & Steel Co. is dependent on the scope of the demand which develops from that source.

Mill prices are: Mild steel bars, 1.75c. to 1.85c., Chicago; common bar iron, 1.75c., Chicago; rail carbon, 1.60c., mill or Chicago.

Jobbers quote 2.48c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.38c. base. Hoops, 3.48c.; Bands, 3.23c.

Bolts, Nuts and Rivets.—Structural and boiler rivets have been advanced to 2.45c. and 2.50c., Pittsburgh, respectively, an increase of 5c. a 100 lb. Bolt and nut discounts have generally advanced about 5 per cent, quotations still being on a f.o.b. Chicago basis for Western buyers.

Jobbers quote structural rivets, 3.10c.; boiler rivets, 3.20c.; machine bolts up to 3/4 x 4 in., 50, 10 and 10 per cent off; larger sizes, 50 and 10 off; carriage bolts up to 3/4 x 6 in., 50 and 5 off; larger sizes, 45 off; hot pressed nuts, squares and hexagon tapped, \$3.25 off; blank nuts, \$3.50 off; coach or lag screws, gimlet points, square heads, 60 per cent off. Quantity extras are unchanged.

Wire Products.—Demand for wire and nails is unabated and shipments continue to lag behind orders and specifications. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 1701.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.10 per 100 lb.; No. 9 and heavier bright basic wire, \$3.25 per 100 lb.; common wire nails, \$3.25 per 100 lb.; cement coated nails, \$2.75 per keg.

Warehouse Prices.—Local jobbers have announced advances of \$2 a ton on blue annealed sheets, \$3 a ton on black and galvanized sheets, \$2 a ton on plates, shapes and soft steel bars, \$5 on hoops and bands, and 10c. per 100-lb. keg on structural and boiler rivets. The new prices are published under the appropriate paragraphs. Billets were also advanced, 0.15 to 0.25 per cent carbon to 2.40c. per lb. and 0.35 to 0.45 per cent carbon to 2.44 1/2c. The extra for 3/16-in. plates was advanced from 16c. to 17c. per 100 lb. The discount on tank rivets 7/16-in. and smaller was advanced to 60 per cent off in keg lots and 55 per cent off in less than keg lots.

Sheets.—The hot weather of the past week seriously crippled operations in local mills and further delayed deliveries on present bookings. The local independent is taking new business cautiously, as it does not wish to commit itself beyond third quarter. A shortage of mill labor is also hampering the execution of production schedules.

Mill quotations are 3.15c. to 3.30c. for No. 28 black, 2.40c. to 2.50c. for No. 10 blue annealed and 4.15c. to 4.30c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 33c. per 100 lb.

Jobbers quote blue annealed, 3.63c.; black, 4.45c.; galvanized 5.45c.

Structural Material.—Although structural lettings are fewer, a number of large jobs have been let or are on the verge of closing. The Wisconsin Steel Works, Chicago, has let 6500 tons for a five-furnace open-hearth plant to the American Bridge Co. The Strat-

ford office building, Chicago, requiring 9000 tons, is expected to be awarded this week. Local mills are heavily booked and are allocating their outputs among customers. For plain material for early delivery, buyers are turning to eastern mills and paying from 1.70c. to 1.80c., base Pittsburgh.

The mill quotation on plain material is 1.75c. to 1.85c., Chicago. Jobbers quote 2.58c. for plain material out of warehouse.

Rails and Track Supplies.—Light rails rolled from new billets have been advanced to 1.75c., mill. Business in angle bars, spikes and bolts is good, although individual orders are smaller than some time ago. Several orders for tie plates, hanging from 800 to 1000 tons each, have been placed. Rolled steel wheels are also being bought in fair quantities.

Standard Bessemer and open hearth rails, \$40; light rails rolled from new steel, 1.75c., f.o.b. makers' mills.

Standard railroad spikes, 2.12c. to 2.25c., Pittsburgh; track bolts with square nuts, 3.12c. to 3.25c., Pittsburgh; tie plates, steel and iron, 1.85c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Cast Iron Pipe.—Springs Wells, Mich., awarded 1000 tons to the United States Cast Iron Pipe & Foundry Co., while the National Cast Iron Pipe Co. will furnish 1600 tons for Cedar Rapids, Iowa. The Lynchburg Foundry Co. will supply a round tonnage for Sauk Center, Minn. West Minneapolis and Hutchinson, Minn., take bids to-day, and Huntington, Ind., is also in the market for pipe.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$50.10 to \$50.60; 6-in. and above, \$46.10 to \$46.60; class A and gas pipe, \$3 extra.

Reinforcing Bars.—This product is very active, probably more active proportionately than most other finished steel commodities. With building construction and road work still expanding, the present strong market is expected to continue through summer or the late fall.

Recent awards include:

St. James' School, Grand Rapids, Mich., 100 tons, to Corrugated Bar Co.

Minneapolis Federal Reserve Bank, 200 tons, to C. A. H. Turner Co.

Caumet power station, South Chicago, 200 tons, to Concrete Steel Co.

International Harvester Co. plant, Fort Wayne, Ind., 400 tons, to Joseph T. Ryerson & Son.

Joliet, Ill., Penitentiary, 125 tons, to Concrete Steel Co.

Union Trust Co. Building, Cleveland, 600 tons, to Bourne-Fuller Co.

Pending business includes:

Library, University of Minnesota, Minn., 450 tons.

University high school, Minneapolis, 200 tons.

High school, St. Paul, 200 tons.

Junior high school, Holland, Mich., 100 tons.

Main Street bridge, Gray Harbor, Wis., 200 tons.

Government hospital, Jefferson Barracks, Mo., several hundred tons.

Plates.—Although the bulk of current business is coming from car builders, an inquiry has been put out by the Sinclair Oil Co. for 35 tanks, requiring 11,000 tons. This is the first sizable tank inquiry which has appeared for several weeks. A local independent is still able to offer six weeks' delivery on new business.

The mill quotation is 1.75c. to 1.85c., Chicago. Jobbers quote 2.58c. for plates out of stock.

Old Material.—Consumers continue to show little interest in the market, but prices remain practically unchanged. The tendency toward weakness which developed following the general slump in buying has largely disappeared and whenever the market is tested, prices show surprising firmness. A number of fair sized orders for malleable, the only recent purchases of consequence, were placed at advanced quotations. Cupola grades are also stronger, grate bars, in fact, being quotably higher than a week ago. Purchases of rolling mill grades are tight, and steel mills have bought nothing. That the latter are now well fortified with open-hearth scrap is indicated by heavy rejections of material now being received. The failure of the market to decline more sharply following the curtailment of consumptive buying was hardly in keeping with past precedents. The explanation seems to lie in the fact that yard dealers have disposed of enough of their accumulations to be in a comfortable position

and now prefer to wait for a resumption of demand rather than to encourage price weakness through offerings on a dull market. The United States Ordnance Department takes bids here Friday on 21,500 tons of shells located at Columbus and Toledo, Ohio, and Sparta, Wis. Railroad lists include the Santa Fe, 4000; the Great Northern, 1000 tons, and the Soo Line, 500 tons.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Iron rails	\$18.00 to \$18.50
Cast iron car wheels.....	18.25 to 18.75
Relaying rails	22.50 to 27.50
Roll'd or forged steel car wheels....	16.25 to 16.75
Steel rails, rerolling.....	15.00 to 15.50
Steel rails, less than 3 ft.....	15.75 to 16.25
Heavy melting steel.....	14.50 to 15.00
Frogs, switches and guards cut apart	14.50 to 15.00
Shoveling steel	14.00 to 14.50
Drop forge flashings.....	10.00 to 10.50
Hydraulic compressed sheet.....	11.50 to 12.00
Axle turnings	12.00 to 12.50

Per Net Ton

Iron angles and splice bars.....	16.00 to 16.50
Steel angle bars.....	13.50 to 14.00
Iron arch bars and transoms.....	17.25 to 17.75
Iron car axles.....	21.50 to 22.00
Steel car axles.....	15.00 to 15.50
No. 1 busheling.....	11.00 to 11.50
No. 2 busheling.....	7.00 to 7.50
Cut forge	12.75 to 13.25
Pipes and flues.....	9.25 to 9.75
No. 1 railroad wrought.....	12.50 to 13.00
No. 2 railroad wrought.....	12.75 to 13.25
Steel knuckles and couplers.....	14.00 to 14.50
Coil springs	14.25 to 14.75
No. 1 machinery cast.....	16.00 to 16.50
No. 1 railroad cast.....	15.25 to 15.75
Low phos. punchings.....	13.50 to 14.00
Locomotive tires, smooth.....	12.00 to 12.50
Machine shop turnings.....	6.75 to 7.25
Cast borings	10.25 to 10.75
Stove plate	13.75 to 14.25
Grate bars	12.75 to 13.25
Brake shoes	12.75 to 13.25
Railroad malleable	15.00 to 15.50
Agricultural malleable	15.00 to 15.50

New York

Drop in Sales of Finished Lines, But Prices Are Firm—Deliveries Extended

NEW YORK, June 13.

Pig Iron.—The market has been very quiet and the largest sale reported was 1000 tons for immediate delivery for the Bridgeport plant of the Crane Co. It is not known where the iron is to come from. Apparently it was not purchased from usual sources and may have been Southern iron. On a basis of \$18, Birmingham, the iron could be delivered at Bridgeport for \$25 and compete with Northern irons, but the Southern market is strong and only a limited amount of resale iron can be had as low as \$18. The Tennessee company is still quoting \$18, but is not an active seller. Prices on Buffalo and eastern Pennsylvania iron are firm. It is not expected that the reduction of 50c. per ton on Lake Superior ore will affect the Eastern market, as little of that ore is used in eastern Pennsylvania furnaces under present conditions.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25..	\$28.52 to \$29.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75..	27.52 to 28.02
East. Pa. No. 2 fdy., sil. 1.75 to 2.25..	27.02 to 27.52
Buffalo, sil. 1.75 to 2.25.....	27.96 to 28.46
No. 2 Virginia, sil. 1.75 to 2.25.....	29.16

Ferroalloys.—Demand for ferromanganese is very light, but some business in moderate sized lots has been done, including both the British and domestic alloy, on the basis of \$67.50, seaboard. Domestic producers, however, after having taken some business at this level, are again quoting on a basis of \$70, seaboard. About 200 tons of spiegeleisen for prompt delivery has been sold at the new price of \$36, furnace, and also a few small lots of 16 to 19 per cent at \$35, furnace, the latter grade, however, being in very scant supply. No developments are noted in manganese ore, quotations for which continue nominal, imports continuing at a low

rate according to official data analyzed elsewhere in this issue. Only moderate activity is reported in the 50 per cent ferrosilicon and in the ferrochromium market. Quotations are as follows:

Ferroalloys

Ferromanganese, domestic, seaboard, per ton.	\$67.50
Ferromanganese, British, seaboard, per ton.	\$67.50
Spiegeleisen, 20 per cent.	\$36.00
Ferrosilicon, 50 per cent, delivered, per ton.	\$57.00 to \$60.00
Ferrotungsten, per lb. of contained metal.	40c. to 50c.
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered.	12c. to 14c.
Ferrovandium, per lb. of contained vanadium.	\$3.00 to \$3.50
Ferrocobaltititanium, 15 to 18 per cent, 1 ton to carloads, per ton.	\$200.00

Ores

Manganese ore, foreign, per unit, seaboard.	25c. to 26c.
Tungsten ore, per unit, in 60 per cent concentrates, nominal.	\$3.00 up
Chrome ore, basis 48 per cent Cr ₂ O ₃ , crude, per unit, Atlantic seaboard.	40c. to 45c.
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₂ , New York.	40c. to 45c.

Warehouse Business.—On practically all materials prices are firm on the new schedule, with the exception of black and galvanized sheets. Quotations on these continue to cover a wide range, with the official price generally 4.35c. and 5.35c. per lb. base on black and galvanized and as low as 4.10c. and 5.10c. per lb. base being done on large lots. On the whole, warehouses feel that June will probably measure up with the previous month, judging by orders during the first two weeks. Dealers in wrought iron and steel pipe report prices much stronger than for some time and a good-sized tonnage of pipe moving. No change in discounts has been made, but considerable improvement in prices has been necessary to reach the quoted discounts. Brass and copper warehouses report good business, with great activity in wire screening and a strong market on copper leader, gutter, sheets and some brass pipe. Buying by radio equipment manufacturers is no longer a factor. We quote prices on page 1728.

High Speed Steel.—The market remains quiet, but business in high carbon tool steel continues better. Quotations on 18 per cent tungsten high speed steel continue at 75c. to 80c. per lb. base.

Cast-Iron Pipe.—The market is active. A producer in this district looks for as large a month's business in June as in any month this year. While the New England district and the East generally have been experiencing the heaviest business both in private and municipal buying, recent reports show great improvement in the South and West. The Phoenix Iron Works Co., Meadville, Pa., has been awarded contract for 1800 tons of cast-iron tunnel lining for the Passaic Valley outfall pressure tunnel being constructed by Holbrook, Cabot & Rollins Corporation. We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, \$50.80; 4-in. and 5-in., \$55.50; 3-in., \$65.80, with \$4 additional for Class A and gas pipe.

Semi-Finished Steel.—The American Locomotive Co., New York, which recently inquired for 2800 tons of forging billets of special analysis, has divided this business among two or more mills, and the price paid is reported to have been \$40, Pittsburgh, or higher with usual extras.

Finished Iron and Steel.—The local steel market is quieter than it has been at any time since the spring buying movement started early in March. A fair volume of business is being booked in some lines, but the aggregate tonnage is less than the mills have been putting on their books during April and May. In structural steel there are many postponements of pending projects, and the delay may be due to the desire to obtain the benefit of the 10 per cent freight rate reduction, effective July 1. As to prices, the market is very firm as mills have substantial amounts of business on their books and are not particularly desirous of selling further ahead in view of the uncertainty as to the coal situation. Some are fighting shy of third quarter contracts even when consumers appear anxious to enter into such contracts. Sheet prices show a firm tendency, notwithstanding the recent announcement of the American Sheet & Tin Plate Co. that its present prices would

hold through July. Within the past week sales have been made at 2.50c. for No. 10 blue annealed, 3.15c. to 3.30c. for black and at 4.30c. for galvanized, Pittsburgh base. Shapes and bars are more generally quoted at 1.70c., Pittsburgh, than at 1.60c., though the latter price seems not to have disappeared altogether, particularly on reinforcing bars. Plates are frequently quoted at 1.70c., Pittsburgh, but on desirable orders some mills still appear willing to sell at 1.60c. Bar iron remains at 1.60c., Pittsburgh, for carloads and at 1.70c. for less than carloads. The delivery situation is no better and few mills are promising better than two to four weeks on plates, six weeks or longer on shapes and about the same period on bars.

We quote for mill shipments, New York, as follows: Soft steel bars, plates and structural shapes, 1.98c. to 2.08c.; bar iron, 1.98c. On export shipments the freight rate from Pittsburgh to New York is 28.5c. per 100 lb. and the domestic rate is 38c.

Coke.—The scarcity of coke is more pronounced and furnace grades are now quoted at \$6.75 to \$7, ovens, and foundry at \$7.50 to \$8. Brokers find it almost impossible to locate any considerable tonnage. By-product coke has been advanced 50c. and is now quoted at \$9.50, seaboard. Reports from the strike regions are not favorable.

Old Material.—The market is still weak and in some materials scarcity of transactions makes it difficult to establish a price. While in some cases \$9 per ton is the best offer made for No. 1 heavy melting steel, the market is still between \$9.50 to \$10 per ton. Both railroad steel and rerolling rails are off about 50c. per ton, buying prices now ranging between \$11 and \$11.50 per ton. Bethlehem's return to the market at \$14.50 per ton for railroad steel has aided in softening the price. Clean cast borings, machine shop turnings and mixed borings and turnings are fairly firm at \$9 to \$10 per ton, with Bethlehem, Lebanon and Phoenixville buying. Phoenixville is paying \$13.50 per ton delivered, which with a \$3.92 freight rate establishes a price of \$9.58 New York, while Steubenville is paying \$15, which with a \$5.74 rate from New York makes a price of \$9.20. The entire market is soft, and with the lower freight rates after July 1, the mills are undoubtedly looking forward to continued low quotations.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.	\$9.50 to \$10.00
Steel rails, short lengths, or equivalent	11.00 to 11.50
Rerolling rails	11.00 to 11.50
Relaying rails, nominal.	27.00 to 28.00
Steel car axles.	11.50 to 12.00
Iron car axles.	19.00 to 20.00
No. 1 railroad wrought.	11.00 to 11.50
Wrought iron track.	11.00 to 11.50
Forge fire	7.50 to 8.00
No. 1 yard wrought, long.	10.50 to 11.00
Cast borings (clean).	9.00 to 10.00
Machine-shop turnings	9.00 to 10.00
Mixed borings and turnings.	9.00 to 10.00
Iron and steel pipe (1 in. diam., not under 2 ft. long).	9.00 to 9.50
Stove plate	9.75 to 10.25
Locomotive grate bars	10.75 to 11.25
Malleable cast (railroad)	10.00 to 10.50
Cast-iron car wheels.	12.00 to 12.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.	\$18.00 to \$20.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.	16.50 to 17.00
No. 1 heavy cast, not cupola size.	13.00 to 13.50
No. 2 cast (radiators, cast boilers, etc.)	12.00 to 12.50

Boston

BOSTON, June 13.

Pig Iron.—Sales in this territory the past week are estimated at 5000 to 5500 tons, including 1000 tons No. 2 plain, immediate delivery, to a Connecticut maker of pipe fittings, 1000 tons silicon 2.25 to 2.75, third quarter delivery, to a Providence, R. I., concern, and 1500 tons, 500 tons each of silicon 2.25 to 2.75, 2.75 to 3.25 and 3.25 to 3.75, to a Massachusetts textile machinery producer. Details on large tonnages are lacking. It is believed, however, Pennsylvania iron was purchased in each instance on a basis of \$28 delivered, or less for No. 2 plain and No. 2X, and 50c. to \$1 a ton more for higher silicon. Eastern Pennsylvania No. 2X was purchased by a Connecticut foundry with a \$3.92

freight at around \$24 furnace, or \$28 delivered, while other Pennsylvania iron sold at \$29.08 delivered or \$22.58 furnace. A New Hampshire foundry turned down 300 tons Pennsylvania No. 2 plain at \$22 furnace with a \$6.58 freight, having a still lower price. One Buffalo furnace is holding to \$25, but other interests are offering iron at \$23 furnace base. The situation in so far as Pennsylvania and Buffalo irons are concerned, therefore, appears unsettled. Alabama iron, on the other hand, holds firm at \$18.50 to \$19 furnace base, one furnace accepting last half and the other last quarter business. Virginia iron is not a factor in this market. The General Electric Co. is in the market for 600 tons silicon averaging 3.50 for its Pittsfield, Mass., plant and 900 tons silicon 3.26 to 3.75, July delivery, for its Lynn, Mass., foundry.

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$10.66 from Alabama:

East. Penn., sil. 2.25 to 2.75.....	\$28.56 to \$29.56
East. Penn., sil. 1.75 to 2.25.....	28.06 to 29.06
Buffalo, sil. 2.25 to 2.75.....	28.96 to 30.96
Buffalo, sil. 1.75 to 2.25.....	28.46 to 30.46
Alabama, sil. 2.25 to 2.75.....	29.66 to 30.16
Alabama, sil. 1.75 to 2.25.....	29.16 to 29.66

Warehouse Business.—Local warehouse prices on iron and steel have advanced \$2 to \$3 a ton, and are reported as strong at the advance. Stocks, generally speaking, are in fair condition, but deferred mill deliveries cause some apprehension. The demand for iron and steel is larger than for the corresponding period in May, which was the best month noted in more than a year. Blue annealed sheets are unchanged in price, but black and galvanized have advanced 15c. per 100 lb. The movement of bolts, nuts and washers continues encouraging, and the trade is talking higher prices. Blacksmiths' drills have been marked up 15 per cent. Warehouse prices on iron and steel follow:

Jobbers quote: Soft steel bars, \$2.60½ per 100 lb. base; flats, \$3.25½; concrete bars, \$2.75 to \$2.88; structural steel, \$2.60½ to \$2.70½; tire steel, \$4 to \$4.35; open-hearth spring steel, \$4.50 to \$6; crucible spring steel, \$11.50; steel bands, \$3.25½ to \$3.68; hoop steel, \$3.66½; cold rolled steel, \$3.30 to \$3.80; refined iron, \$2.60½; best refined iron, \$4.25; Wayne iron, \$5.50; Norway iron, \$5.75 to \$6; plates, \$2.70½ to \$2.87½; No. 10 blue annealed sheets, \$3.40½ to \$3.63 per 100 lb. base; No. 28 black sheets, \$4.90; No. 28 galvanized sheets, \$5.90.

Cast Iron Pipe.—Due to the sold-up condition of cast iron pipe makers shipping into this territory, the tonnage booked from week to week is comparatively small. A noticeable shortage in stocks of many New England municipalities exists. Turners Falls, Mass., is calling for bids on 15,000 ft. of 8, 10 and 16-in. pipe for a new supply line. North Adams, Mass., contemplates making a short extension to its line; Chicopee, Mass., is considering laying two miles of large pipe for a water supply; Worcester, Mass., contemplates laying five to ten miles of new pipe line this summer; and Putnam, Conn., plans the installation of mechanical filters within the near future, which will require a considerable amount of pipe and fittings. Cast iron pipe prices recently advanced \$2 a ton to a basis of \$52.70 for 6-in. and larger delivered Boston rate points, and of \$57.70 on 4-in. stock, with the usual \$4 differentials on gas pipe, etc.

Soil Pipe.—Because of the pronounced increase in building throughout this territory, the demand for soil pipe is unusually heavy and foundries are sold ahead several months. The market has advanced from 63, 10, 10 and 5 to 43, 10, 10 and 5 per cent discount from list within the past two months, and New England producers in a few instances are securing premiums on small tonnages for prompt shipment.

Coke.—New England by-product coke producers continue to quote foundry contract coke at \$11 delivered and spot at \$11.50 where the local freight does not exceed \$3.40 a ton. One producer intimates a change in the price of spot coke will be forthcoming this week. Additional tonnages were booked the past week for last half contract coke, most of them involving small amounts. New England foundries, generally speaking, are well covered on fuel requirements for this period.

Old Material.—Some dealers continue to report good business in old material suitable for Pennsylvania mills

at unchanged prices. They have, in a few instances, made provision on recent sales covering the reduction in freight rates on shipments extending into July. A majority of the trade, however, say business has flattened out almost to nothing, except on mixed borings and turnings. Slightly more interest is shown by New England foundries in ordinary machinery cast. Several car lots sold last week at \$19 to \$19.50 delivered. Textile machinery cast is in light supply and easily worth 50c. a ton more than selected machinery.

The following prices are for gross ton lots delivered common consuming points:

No. 1 machinery cast.....	\$19.00 to \$20.00
No. 2 machinery cast.....	17.00 to 18.00
Stove plate	13.50 to 14.00
Railroad malleable	15.00 to 15.50
Street car wheels.....	18.00 to 19.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$10.50 to \$10.75
No. 1 railroad wrought.....	11.50 to 12.00
No. 1 yard wrought.....	10.00 to 10.50
Wrought pipe (1 in. in diameter, over 2 ft. long).....	8.50 to 9.00
Machine shop turnings.....	8.00 to 8.25
Cast iron borings, rolling mill.....	8.00 to 8.25
Cast iron borings, chemical.....	10.00 to 10.50
Blast furnace borings and turnings.....	8.00 to 8.25
Forged scrap	7.00 to 7.50
Bundled skeleton	7.50 to 8.00
Street car axles.....	13.50 to 14.00
Shafting	14.50 to 15.00
Rerolling rails	11.00 to 11.50

Buffalo

BUFFALO, June 12.

Pig Iron.—Pig iron inquiry shows a substantial increase. One furnace interest, which last week advanced its asking price from 1.75 to 2.25 per cent silicon iron to \$25, is asking \$25.50 and \$26 for the higher silicon foundry grades. Other furnaces have not made similar advances yet, although the tendency is toward firmer price lists. Some sales are still being made on a basis of \$22.50 to \$23, but producers are not anxious to sell at this price. There have been some malleable sales at \$25. Coke prices are slightly higher, but the supply is apparently increasing.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.....	\$23.00 to \$24.00
No. 2X foundry, 2.25 to 2.75 sil.....	22.50 to 23.50
No. 2 plain, 1.75 to 2.25 sil.....	22.00 to 23.00
Basic	23.50
Malleable	22.00 to 23.00
Lake Superior charcoal.....	29.14

Finished Iron and Steel.—The Lackawanna Steel Co. has put into effect increased prices on shapes and plates, advancing the former from 1.70c. to 1.80c. and the latter to 2c. Bar prices are unchanged, the Lackawanna quotations remaining at 1.70c., which is the ruling price of the district, although the Donner Steel Co. is asking 1.75c. The 1.60c. bar price has disappeared from current quotations. There is a good demand for bars for third quarter delivery. Warehouses are getting considerable business because of mills' inability to make spot deliveries of many materials. Wire demand continues excellent, with operation at 100 per cent. A brisk structural steel demand has developed for lots of 100 tons and under. So heavy is this demand that mills are unable to make prompt deliveries. The result is warehouses are getting a substantial share of the structural business, builders being disposed to pay the higher prices rather than wait for deferred deliveries. Warehouses have been large buyers and trading during the past 10 days has been on an unusually large scale, despite the lack of large tonnage orders.

We quote warehouse prices, f.o.b. Buffalo, as follows: Structural shapes, 2.65c.; plates, 2.65c.; soft steel bars, 2.55c.; hoops, 3.30c.; bands, 3.15c.; blue annealed sheets, No. 10, 2.55c.; galvanized steel sheets, No. 28, 5.40c.; black sheets, No. 28, 4.40c.; cold-rolled strip steel, 6.05c.; cold-rolled round shafting, 3.35c.

Old Material.—All of the steel plants in the Buffalo district continue to buy heavy melting steel at \$16.75 to \$17, with the latter figure as the more general one except in large tonnage transactions. New York Central lists closed strong at \$16.75, it is understood. The mills are buying freely at this price and dealers show a disposition to clean out their yards at ruling quotations. Hydraulic compressed is in good demand. Valley

consumers have been buying turnings and borings in this district, their offers being sufficiently above those of local consumers to offset freight charges. Scrap production is increasing.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$16.75 to \$17.00
Low phos., 0.04 and under.....	18.00 to 19.00
No. 1 railroad wrought.....	16.00 to 16.50
Car wheels.....	17.00 to 18.00
Machine shop turnings.....	10.50 to 11.00
Cast iron borings.....	12.50 to 13.00
Heavy axle turnings.....	14.00 to 14.50
Grate bars.....	14.00 to 14.50
No. 1 busheling.....	15.00 to 15.50
Stove plate.....	15.00 to 15.50
Bundled sheet stampings.....	11.50 to 12.00
No. 1 machinery cast.....	18.00 to 18.50
Hydraulic compressed.....	15.00 to 15.50
Railroad malleable.....	17.00 to 17.50

Cincinnati

CINCINNATI, June 13.

Pig Iron Firm, with Southern Ohio Higher—Contracting for Coke

Pig Iron.—The pig iron market was unusually quiet during the past week, but several fair-sized inquiries received in Monday's mail for third quarter requirements give hopes of another buying movement such as was experienced some weeks ago. Prices are unusually firm, southern Ohio quotations having advanced 50c. during the week, and Southern iron holding its own at \$18.50, with several furnaces quoting \$20 for third and fourth quarters. There is a small tonnage of Southern resale iron on the market, however, for prompt shipment which can be had at \$18, Birmingham. There were no sales of any consequence during the week, the largest reported being 500 tons of southern Ohio iron at \$23.50, furnace. Several 300-ton lots were also disposed of in the district, but the aggregate tonnage booked was rather small when compared with previous weeks. Inquiries, however, are heavier. An Indianapolis melter wants 1000 tons, 500 Northern and 500 Southern. A northern Ohio malleable consumer is in the market for 700 tons of malleable, and a central Ohio melter for 1000 tons of foundry. A Pennsylvania melter is also inquiring for 1000 tons of foundry iron, and a Michigan melter for 700 tons of charcoal iron. The National Cash Register Co., Dayton, which bought 300 tons of Southern last week, is inquiring for 300 tons of Northern. Milton silvery furnace in southern Ohio will blow in on Thursday.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base).....	\$23.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)....	23.50
Ohio silvery, 8 per cent.....	35.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)....	25.52
Basic Northern.....	26.52
Malleable.....	26.02

Finished Material.—The demand for automobile body sheets continues heavy, and price seems to be no object if early delivery can be secured. Recent advances of independent mills to 4.65c. and 4.75c. for July shipment has had no effect on the buying, with the exception, perhaps, that it has stimulated the desire of the manufacturers to have their third quarter requirements shipped during this month, as with conditions as they are to-day they are figuring that prices for August and September will be higher, and their chances of getting material much lessened. There has been a letup in the demand for the heavier products, and while carload orders are still common, the demand has been pretty well satisfied for this month at least. Desirable specifications are being booked by mills for delivery in six to seven weeks. Prices are firming up considerably, and 1.70c. on bars, shapes and plates is now considered as the minimum for reasonably early shipment. Reinforcing bars are in good demand, and we note orders for 500 tons, 300 tons and several for 100 to 200 tons, placed with a Cleveland district mill during the week. Several building projects which are expected to be placed this week will take about 1500 tons of bars, protections on which are out. The wire market is running along at about the same rate as last week, sales of nails and manufacturing wire being fairly good. Jobbers are fairly well supplied to meet the current demands, but with increased building operations the de-

mand for nails in particular will insure fairly heavy orders during the next three months. There have been no important lettings in the structural field, but a number of sizable projects will likely be awarded during the present week.

Warehouse Business.—Local jobbers have advanced the price of hoops \$5 per ton, and are now quoting 3.60c., base. The price on bands is unchanged at 3.35c. The demand for hot-rolled products continues good, but cold-rolled materials continue to move sluggishly. Jobbers in wire products report only fair activity, nails being the exception.

Jobbers quote: Iron and steel bars, 2.75c. base; hoops, 3.60c.; bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82½c. base; cold-rolled rounds, 3.35c. base; flats, squares and hexagons, 3.85c. base; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.50c.; No. 28 galvanized sheets, 5.50c.; No. 9 annealed wire, \$2.70 per 100 lb.; common wire nails, \$2.85 per keg, base.

Fluorspar.—An inquiry for 900 tons of gravel fluorspar is current, and sales of smaller quantities are in fair volume. Prices are firm at \$16 to \$17.50.

Coke.—A sale of 12,000 tons of domestic coke for delivery over the rest of the year stands out. The domestic market is coming to life and many contracts were made last week. Furnace coke is very scarce. In this connection the report persists that over 100,000 tons of Alabama coke has already been shipped into the valley districts. Foundry coke is in fair demand, a melter in this district having purchased 60 cars of by-product fuel during the week. Prices are unchanged, Connellsville Foundry for prompt shipment being quoted at \$6.50 to \$7, New River at \$7.50 to \$8, and Wise County \$6 to \$6.50.

Old Material.—There is little in the local scrap market. We note a sale of 300 tons of borings to a Southern furnace at around \$12, delivered, and 200 tons of heavy melting steel at around \$16, delivered, in this district. The market is inclined to softness, but prices show no appreciable change.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton	
Bundled sheets.....	\$8.00 to \$8.50
Iron rails.....	13.50 to 14.00
Relaying rails, 50 lb. and up.....	26.50 to 27.00
Rerolling steel rails.....	13.50 to 14.00
Heavy melting steel.....	13.00 to 13.50
Steel rails for melting.....	13.00 to 13.50
Car wheels.....	14.50 to 15.00
Per Net Ton	
No. 1 railroad wrought.....	11.50 to 12.00
Cast borings.....	8.50 to 9.00
Steel turnings.....	7.50 to 8.00
Railroad cast.....	14.00 to 14.50
No. 1 machinery.....	16.00 to 16.50
Burnt scrap.....	9.50 to 10.00
Iron axles.....	18.00 to 18.50
Locomotive tires (smooth inside)....	11.00 to 11.50
Pipes and flues.....	6.50 to 7.00

Birmingham

BIRMINGHAM, ALA., June 13.

Pig Iron.—The end of the first week of June found the Birmingham iron market intrenched at \$18.50 minimum, with two makers asking \$20 and one making sales at that base on small tonnages. The total business of the week was not large. A lot of 500 tons for a Louisville melter brought \$18.50. One maker retired from the market early in the week after having booked around 2000 tons, which was the remainder of unsold third quarter capacity, at \$19. Toward the end of the week this maker re-entered for fourth quarter at \$20. Another maker sold on a \$20 basis during the week and a half dozen bookings were from car loads to 200 tons. The two largest foundry makers had not advanced beyond \$18.50 at the end of the week, but the advance was in sight. Charcoal iron has become active and Shelby stack of the Shelby Iron Co. resumed last week with very good business on books and a brisk inquiry over a scattered territory. The record low of furnace yard stocks is regarded as establishing Birmingham iron in the strongest statistical position in its history. The total of iron available for merchant trade June 1 was only 40,000 tons, including machine cast. Total active stacks now are eight on basic, 12 on merchant iron and two on charcoal iron. One thousand tons moved to the Pacific Coast last week. Production this month will be well over 200,000 tons. The Tennessee company changed a Bessemer furnace from

basic to foundry several weeks ago, being forced to that action by bookings for large pipe concerns. It is expecting a large movement of Brazilian ore through the port of Mobile beginning this month and one furnace will probably go on manganese production for some time. The Tennessee company is understood to be using manganese in increasing quantities.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25.....	\$18.50 to \$19.00
Basic	18.50 to 19.00
Charcoal, warm blast.....	30.00 to 32.00

Finishing Mills.—The Tennessee company's 100 per cent of steel production continues with double turn at these plants: Ensley rail and blooming mills, Fairfield structural and tie-plate plants, Bessemer plate, guide and bar mills, with car works busy on repairs and new cars. Wire drawing mills are as near capacity as machinery and men allow. Hoop and band mills are busy. Exports are increasing. The following was the cargo of the Japanese steamer Kyufuku Maru leaving Mobile last Saturday: 3001 tons of rails for Yokohama, 942 tons of rails for Chemulpo, Korea, also 118,000 lb. of steel bars and 78,000 lb. of steel bolts and nuts; 224,000 lb. of wire, 96 tons of rails, 7800 lb. of bolts and nuts and 10,000 tons of spikes and bars for Kobe. The Welded Products Co. is manufacturing one-piece steel dump cars for brick yards and one-piece lime-kilns, the latter to be lined with brick. Both are innovations. The Vulcan Rivet Works has begun the manufacture of mine spikes.

Cast Iron Pipe.—Pressure pipe base remains firm at \$37 and sanitary firm at \$55. The leading sanitary interest is out of the market and pressure pipe makers are full. The American Cast Iron Pipe Co. has booked 1500 tons for Minneapolis and 1000 for Herrin, Ill. West Coast shipments are regularly and continuously heavy.

Coal and Coke.—Coal has risen from \$1.75, Pratt seam base, to \$2 following extra Western demand. A total of 3000 cars on account of strike is the estimate of total ordered so far. The new rate of \$4.47 on coke to Chicago, in effect June 9, has brought about several trial shipments with problematical result as to real business. Average for standard foundry is \$5.50.

Old Material.—The cast scrap market is very active and the scrap steel market is expanding, Atlanta having taken considerable quantities. Semi-steel makers are taking much steel. Yard outgo and influx remain on an even keel.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	\$13.00 to \$14.00
No. 1 steel.....	12.00 to 13.00
No. 1 cast.....	14.00 to 15.00
Car wheels	13.00 to 14.00
Tramcar wheels	12.00 to 13.00
Stove plate	12.00 to 13.00
Cast iron borings.....	6.00 to 7.00
Machine shop turnings.....	4.00 to 5.00

Cleveland

Pig Iron Sales Amount to 25,000 Tons—Ore Prices Are Fixed

CLEVELAND, June 13.

Iron Ore.—Ore prices have been established at a reduction of 50c. per ton as fully explained elsewhere in this issue.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$5.95; Old range non-Bessemer, 51½ per cent iron, \$5.20; Mesabi Bessemer, 55 per cent iron, \$5.70; Mesabi non-Bessemer, 51½ per cent iron, \$5.05.

Pig Iron.—The market showed considerable activity during the week following a quiet period of several days' duration. Three local interests that at present are more active sellers report orders booked during the week aggregating over 25,000 tons, mostly in small lots. There were a few sales of malleable iron, but the bulk were for foundry iron and nearly all for the third quarter. In a few cases, foundries have taken business for shipment extending a few weeks beyond Oct. 1, but generally are limiting sales to the third quarter. The largest orders reported are two 900-ton lots, one placed by an Indiana machinery manufacturer and the other

by an Ohio jobbing foundry. An Indianapolis equipment manufacturer, who inquired for 2000 tons of foundry iron is reported to have placed this in Chicago. Prices are unchanged and firm at a minimum of \$23, lake furnaces, with \$24 at furnace the usual quotation for local shipment or to nearby points. Several sales are reported for shipment from Cleveland to the Pittsburgh territory, some of which were made at \$24 at furnace or equivalent to \$25 Valley. A Valley furnace that will shortly go into blast is offering foundry iron for July shipment at \$25. Basic iron is inactive and firm at \$25. Southern iron is quiet, although a few small lot sales are reported at \$18.50, which appears to be the minimum price.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations except basic are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic, Valley furnace.....	\$25.00
Northern No. 2 fdy., sil. 1.75 to 2.25.....	\$23.00 to 24.00
Southern fdy., sil. 1.75 to 2.25.....	25.17
Ohio silvery, sil. 8 per cent.....	33.86
Standard low phos., Valley furnace.....	34.00 to 35.00

Semi-Finished Steel.—The demand for sheet bars for third quarter delivery continues active. One Cleveland mill made several sales during the week, including a 12,000-ton lot to an Ohio mill. This producer is quoting sheet bars at \$35 either Cleveland or Youngstown, depending on the shipping point, and reports one sale at a price equivalent to \$37, Youngstown.

Finished Iron and Steel.—While there is still a fair volume of business, buying has fallen off somewhat. Most consumers now have good-sized orders on mill books and are getting deliveries to meet their immediate requirements, although mill shipments are getting further behind. On steel bars, plates and structural material, 1.60c. is still the minimum quotation for delivery at the convenience of the mill, but this price is less common owing to an advance during the week to 1.75c. by one independent Pittsburgh district mill. Quotations range from 1.60c. to 1.70c. for steel bars to 1.80c. for structural material and to 2c. for plates. Reinforcing bars are in good demand and somewhat firmer. A Cleveland mill has taken 700 tons for the Union Trust Building, Cleveland. One mill that has been shading this price is now adhering to 1.60c. for hard steel reinforcing bars. A new inquiry has come from the Sinclair Oil Co. for 65 oil tanks requiring 16,000 tons of plates which are being figured on by Ohio tank shops. Specifications are still coming in good volume from automobile and parts manufacturers with preliminary details completed. Engineers are now working on plans for the new Union passenger station in Cleveland, but it is not expected that much steel will be required for this work inside of a year. The plans contemplate the construction of one or possibly two bridges across the Cuyahoga River. A Valley district mill is now quoting hot-rolled strip steel at a minimum of 2.40c. for July shipment and reports sales at 2.50c. The same producer is quoting cold-rolled strip steel at 4c. for delivery through the third quarter.

Jobbers quote steel bars, 2.41c.; plates and structural shapes, 2.51c.; No. 9 galvanized wire, 3c.; No. 9 annealed wire, 2.50c.; No. 28 black sheets, 3.90c.; No. 28 galvanized sheets, 4.90c.; No. 10 blue annealed sheets, 3.15c. to 3.21c.; hoops and bands, 3.06c.; cold-rolled rounds, 3.20c.; flats, squares and hexagons, 2.70c.

Sheets.—Attempts to advance blue annealed sheet prices have not been wholly successful, as some of the independent mills which were a few days ago quoting these at 2.60c. to 2.75c. have gone back to the American Sheet & Tin Plate Co.'s price of 2.40c. for July delivery. However, some mills report sales at 2.55c. Black and galvanized sheets are being most generally held by independent mills at the \$3 advance to 3.30c. and 4.30c. respectively. Some business is being booked at these prices for July shipment. The Brier Hill Steel Co. will start its plant at Niles this week.

Warehouse Business.—The demand continues heavy. Some jobbers report sales larger than at any previous time in two years. Warehouses are still adhering to the sheet prices that prevailed before the recent advance by some of the mills.

High Speed Steel.—The demand for high speed steel in small lots is showing an improvement. Prices range from 65c. to 80c. per lb., depending on the quantity.

Coke.—A limited amount of Connellsville foundry coke is available at \$7. The demand is light. Wise County coke is quoted at \$6.50 and Indianapolis by-product foundry coke at \$8.

Bolts, Nuts and Rivets.—Cleveland bolt and nut makers expect to follow the lead of some of the Pittsburgh manufacturers and advance prices during the next two or three days. They are now figuring on their probable costs for the third quarter and say that increased costs justify an advance. Some third quarter business is being taken at present prices, but makers do not seem inclined to book a great deal of business at these prices. The leading Cleveland rivet manufacturer has advanced prices \$3 per ton to 2.40c. for structural rivets and 2.50c. for boiler and is quoting these prices for the third quarter. The same maker has advanced small rivets to 70 and 10 per cent off list. Some makers are quoting small rivets at 70 and 5 per cent off list.

Old Material.—The market continues dull. Mills are either doing no buying or are purchasing only very small lots, not being actively in the market. Prices are holding firm and dealers report that present prices are bringing out only a limited amount of material. Heavy melting steel offered by the New York Central Railroad was sold late in the week at \$18.10, Youngstown. Quotations are unchanged.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel.....	\$15.25 to \$15.50
Steel rails, under 3 ft.....	15.75 to 16.00
Steel rails, rerolling.....	16.00 to 16.50
Iron rails.....	14.00 to 15.00
Iron car axles.....	18.00 to 19.00
Low phosphorus melting.....	16.00 to 16.25
Cast borings.....	12.50 to 13.00
Machine shop turnings.....	11.75 to 12.00
Mixed borings and short turnings.....	12.50 to 13.00
Compressed steel.....	12.85 to 13.25
Railroad wrought.....	14.00 to 14.50
Railroad malleable.....	15.50 to 16.00
Light bundled sheet stampings.....	10.00 to 10.25
Steel axle turnings.....	13.00 to 13.50
No. 1 cast.....	17.00 to 17.50
No. 1 busheling.....	11.25 to 11.75
Drop forge flashings over 10 in.....	11.00 to 11.50
Drop forge flashings under 10 in.....	11.25 to 11.75
Railroad grate bars.....	14.00 to 14.50
Stove plate.....	14.00 to 14.50
Pipes and flues.....	11.00 to 11.50

St. Louis

ST. LOUIS, June 13.

Pig Iron.—The market for pig iron continues strong. The demand is fairly large, being mostly for from one carload to 300 tons, although one sale of 1000 tons of foundry iron by the local maker to an East Side melter is reported. The local maker's movement is in excess of its make, shipments being made from stock. There seem to be two classes of buyers: those who are eager to get their shipments started promptly because they need the iron to use in filling orders on their books, while others whose stocks are in better shape are asking for a suspension of shipments until July 1, when reduced freight rates become effective. A Pacific Coast melter bought 300 tons of foundry iron. The principal pending inquiry is for 2000 tons of foundry iron and 1000 tons of malleable for an implement concern at Moline, Ill., while 1500 tons of malleable is wanted by an Indianapolis concern. Iron of high silicon content is wanted by a number of melters, but the makers, too, seem to be short of these grades, and it is extremely difficult to get orders placed. The market is unchanged at \$23, Chicago, for Northern iron and \$18.50 to \$19, Birmingham, for Southern iron, the lower price being made by the Sheffield maker. The only thing of note in the market for ferroalloys is an inquiry for from 300 to 500 tons of ferrophosphorus by a local plant.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.40 freight from Chicago and \$5.74 from Birmingham:

Northern foundry, sil. 1.75 to 2.25...	\$25.40
Northern malleable, sil. 1.75 to 2.25...	25.40
Basic.....	25.40
Southern foundry, all rail, sil. 1.75 to 2.25.....	\$24.24 to 24.74
Southern foundry, water and rail, sil. 1.75 to 2.25, f.o.b. St. Louis.....	22.74

Finished Iron and Steel.—The principal letting of the week was for 800,000 high-carbon hot-worked tie plates by the Missouri, Kansas & Texas Railway to the Railway Supply Co., which will have them made by the

Scullin Steel Co. The contract involved about 2400 tons, and the price was \$38 per net ton, St. Louis. No other railroad inquiries of importance are pending. The general contract for the high school at Danville, Ill., involving 345 tons of structural steel, has been awarded to Jesse I. Gidney of East St. Louis. James Stewart Construction Co. is the low bidder on the Memphis Auditorium and Market House, involving 2000 tons of structural steel and 500 tons of reinforcing bars. Local fabricators are doing a better business, which is reflected in their buying, which in from a carload to 100 ton orders makes up a fairly large volume.

For stock out of warehouse we quote: Soft steel bars, 2.47½c. per lb.; iron bars, 2.47½c.; structural shapes, 2.57½c.; tank plates, 2.57½c.; No. 10 blue annealed sheets, 3.62½c.; No. 28 black sheets, cold rolled, one pass, 4.30c.; cold drawn rounds, shafting and screw stock, 3.40c.; structural rivets, \$3.09½ per 100 lb.; boiler rivets, \$3.19½; tank rivets, 7/16 in. and smaller, 60 and 10 per cent off list; machine bolts, large, 60 per cent; small, 60 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 60-5 per cent; hot pressed nuts, square or hexagon blank, \$3.50; and tapped, \$3.25 off list.

Coke.—A much better demand for coke has been coming from industries which are substituting coke for coal more and more as the coal strike progresses. The demand for domestic coke is light and probably will continue so until after July 1. The price of the best Connellsville grades is \$7.

Old Material.—The market for old material is rather soft. A great deal of stuff is coming in and there is no buying on the part of consumers. The dealers are well stocked up and are willing to let go at low prices. Rerolling steel rails, cast-iron car wheels are off 50c. and there is a decline of 25c. in No. 1 railroad heavy melting steel. No railroad lists are pending.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton

Old iron rails.....	\$16.75 to \$17.25
Steel rails, rerolling.....	14.00 to 14.25
Steel rails, less than 3 ft.....	15.00 to 15.50
Relaying rails, standard section.....	25.00 to 28.00
Cast iron car wheels.....	17.00 to 17.50
No. 1 railroad heavy melting steel.....	13.00 to 13.50
No. 1 heavy shoveling steel.....	12.50 to 13.00
Ordinary shoveling steel.....	12.50 to 13.00
Frogs, switches and guards, cut apart.....	14.00 to 14.50

Per Net Ton

Heavy axle and tire turnings.....	9.50 to 10.00
Steel angle bars.....	12.75 to 13.25
Iron car axles.....	23.00 to 23.50
Steel car axles.....	16.50 to 17.00
Wrought iron bars and transoms.....	18.00 to 18.50
No. 1 railroad wrought.....	12.50 to 13.00
No. 2 railroad wrought.....	12.00 to 12.50
Railroad springs.....	15.00 to 15.50
Steel couplers and knuckles.....	15.00 to 15.50
Cast iron borings.....	8.50 to 9.00
No. 1 busheling.....	11.00 to 11.50
No. 1 railroad cast.....	15.50 to 16.00
Stove plate and light cast.....	12.75 to 13.25
Railroad malleable.....	12.75 to 13.25
Pipe and flues.....	8.00 to 8.50
Machine shop turnings.....	6.50 to 7.00

Unusual Testimony in Basing Point Controversy

DULUTH, MINN., June 13.—A hearing in the Pittsburgh Plus complaint case was held here to-day. From a technical viewpoint, Duluth did not have a particularly strong case. Few manufacturers or fabricators could show losses due to the practice, and if the case were conducted along the somewhat narrow lines at times attempted in the past—that is, to show actual injury to establish business—a hearing in Duluth would be unproductive.

The case at Duluth and Superior differs in that the attempt is to prove that by reason of the present practice, no business can start without some unusual or monopolistic protection. The hearing, therefore, devolved into a more or less technical discussion of freight rates and of what might occur were these less discriminatory.

Attorneys Steinhauer and Pickering appeared for the Federal Trade Commission, G. H. Stear for Duluth, and Attorneys Corlett and Clark for the Steel Corporation.

The fact that any hearing at all was held here indicates a broader view of the situation than the commission has at times taken.

Philadelphia

Price Trend Still Upward — Sales of Steel Equal Shipments

PHILADELPHIA, June 13.—While steel buying does not appear to be so active as during April and May, the fact remains that most of the steel companies are booking a volume of business that is at least equal to their shipments. Presumably the higher prices are acting somewhat as a deterrent on buying, but there is still a good demand from many sources, but principally from the railroads, automobile plants and the building trade. The inability of the subsidiaries of the Steel Corporation to promise definite early delivery on many of their products is forcing a good deal of business into the hands of those independents which can make earlier shipments. Plates, shapes and bars are now firm at 1.70c., Pittsburgh, there being rare exceptions to this level except when a buyer is willing to place orders for shipment at mill convenience, the leading interest quoting 1.60c., Pittsburgh, in most instances on such business. Some of the independent sheet companies have followed the lead of the American Sheet & Tin Plate Co. in opening their books for July contracts, but at prices usually \$3 a ton above the schedule of that company.

The pig iron market is quiet, but prices are higher and most of the eastern Pennsylvania active furnaces are wholly or partially out of the market. The only weakness is in scrap, and this is not reflected to any extent in prices, but offerings are being more freely made.

Pig Iron.—Of the several active merchant furnace interests in eastern Pennsylvania and New Jersey only one, the Replogle Steel Co., which has a furnace on at Wharton, N. J., is selling iron freely. Two furnaces, Warwick and Brooke, are wholly out of the market, and the others are selling in a very limited way, and in fact, are considering practically no business except that which comes from their regular customers. There is no pressure at the moment from melters for third quarter iron and such inquiries might meet with hesitation on the part of the furnaces to make further commitments for that period. It is estimated that the active furnaces have sold from 25 to 50 per cent of their estimated third quarter production, and in view of the continued uncertainty of the coke situation and the high prices prevailing they would prefer to sell very conservatively for the present. One furnace company has put up its prices to \$26 for No. 2 plain, \$27 for No. 2X and \$29 for No. 1X, and even at these prices is not seeking business. Another will take a little business for August-September shipment from regular customers only at \$25, furnace, for No. 2 plain and \$26, furnace, for No. 2X. The lowest prices are \$24.50 for No. 2 plain, \$25 for No. 2X and \$25.50 for No. 1X, but the furnace making these quotations has a freight rate of \$1.82 to Philadelphia; even so, it is the lowest seller in this market to-day. A single carload of No. 2 plain iron was sold by a nearby furnace at \$30, furnace, which is the highest price reached since the upward price movement began. There are a few inquiries totaling several thousand tons for third quarter, but otherwise the market is quiet, sales during the week having been limited to small tonnages. There is no activity in steel-making grades.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton.

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$26.32 to \$26.84
East. Pa. No. 2X, 2.25 to 2.75 sil.	26.82 to 27.84
East. Pa. No. 1X	27.32 to 29.84
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.74 to 28.24
Virginia No. 2X, 2.25 to 2.75 sil.	28.24 to 28.74
Basic delivery eastern Pa.	25.00 to 25.50
Gray force	24.00 to 25.00
Malleable	25.50
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	30.00

Ferromanganese.—Domestic producers of ferromanganese are now freely quoting \$67.50, seaboard, which is the same as the British price. One domestic interest is sold up until September. A few inquiries for 100-ton lots of spiegeleisen have been quoted on, presumably at \$36, furnace, which is the ruling price.

Plates.—An indication of the strength of the plate market was afforded by a purchase of 1200 tons for shipment in June or early in July at 1.70c., Pittsburgh. It is stated that every quotation but one on this inquiry was 1.70c. The one mill which named a lower price quoted 1.60c., Pittsburgh, but could not promise early delivery. Some mills are getting 1.75c., Pittsburgh, for small lots, and a Buffalo mill has virtually withdrawn from the market by quoting 2c., Pittsburgh. While there is no marked activity in plates, orders are about on a par with shipments and most of the mills have fairly good backlogs. Shipments, however, can be made by independent mills within a few weeks. The Norfolk & Western Railroad is in the market for its third quarter requirements, about 3000 tons of plates, shapes and bars, and smaller tonnages are being inquired for by the Chesapeake & Ohio and Seaboard Air Line. The Pennsylvania Railroad has inquired for 500 to 1000 tons of car plates. We quote universal and sheared plates, ¼ in. and heavier, at 1.70c., Pittsburgh.

Structural Material.—Generally the market for structural shapes is firm at 1.70c., Pittsburgh, though it is intimated that 1.65c. might be done on an attractive tonnage. A few thousand tons was sold last week by one mill at 1.60c., Pittsburgh. Most of the fabricators are covered until July 1 at lower prices, but it is probable that from now on the higher price of steel will be reflected in higher quotations on fabricated steel buildings. The Eastern Steel Co., which started its 12-in. shape mill a few weeks ago, will put its 19-in. and 28-in. mills in operation within two weeks. Cold steel on hand is sufficient for the initial operation and the open-hearth department will not resume work until later. We quote plain material at 1.70c., Pittsburgh.

Bars.—The demand for bars and such bar mill products as spring steel and special sections for automobile work continues exceptionally good. New orders in volume are fully equal to shipments. A considerable volume of business is coming from the Detroit automobile district and even Chicago consumers have bought bars at 1.70c., Pittsburgh, indicating that Chicago mills cannot make early deliveries. Bar iron makers still quote 1.60c., Pittsburgh, for carload lots and 1.70c. for less than carloads.

Sheets.—Some of the independent sheet mills have followed the lead of the American Sheet & Tin Plate Co. in opening their books to customers for July only. In one or two instances mills have agreed to make reservations for the remainder of the third quarter with prices to be named later. The prices named by mills on July business are generally \$3 a ton higher than those of the American Sheet & Tin Plate Co., being 2.55c. for blue annealed, 3.30c. for black, and 4.30c. for galvanized, all base Pittsburgh. Blue annealed, however, has been sold at prices ranging from 2.40c. to 2.50c., Pittsburgh.

Warehouse Business.—Local warehouses have advanced prices on plates, shapes and bars from \$2 to \$4 a ton. We quote as follows for local delivery:

Soft steel bars and small shapes, 2.56c.; iron bars (except bands), 2.56c.; round edge iron, 2.75c.; round edge steel, iron finish, 1½ x ¼ in., 2.75c.; round edge steel planished, 3.50c.; tank steel plates, ¼-in. and heavier, 2.66c.; tank steel plates, 3/16-in., 2.85c.; blue annealed steel sheets, No. 10 gage, 3.40c.; black sheets, No. 28 gage, 4.25c.; galvanized sheets, No. 28 gage, 5.25c.; square twisted and deformed steel bars, 2.65c.; structural shapes, 2.66c.; diamond pattern plates, ¼-in., 4.35c.; 3/16-in., 4.50c.; spring steel, 3.50c.; round cold-rolled steel, 3.20c.; squares and hexagons, cold-rolled steel, 3.70c.; steel hoops, No. 13 gage and lighter, 3.35c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.21c.; iron bands, 3.90c.; rails, 2.36c.; tool steel, 8c.; Norway iron, 5.50c.; toe calk steel, 4.50c.; tire steel, 2.65c.; planished tire steel, 3.40c.

Semi-Finished Steel.—Open-hearth reolling billets are generally quoted at \$35, Pittsburgh, and forging billets at \$38 to \$40, Pittsburgh. Wire rods have been sold at \$40, Pittsburgh.

Coke.—Blast furnace coke is hard to get, but occasional carloads are offered at \$7, Connellsville. Foundry coke is being sold at about the same price.

Old Material.—Scrap is offered freely, but there are few buyers, several of the Eastern mills having withdrawn from the market. There is a slight weakness in No. 1 heavy melting steel, which, however, is not reflected in prices. A near-by mill paid \$15, delivered, a few days ago for several thousand tons. Machine-shop turnings for rolling mill use are 50c. a ton higher.

Pipe scrap is slightly weaker. A steel mill has made a sale of low phosphorus scrap at the following prices: 0.03 per cent phosphorus, \$23, mill; 0.035 per cent, \$22; 0.04 per cent, \$21. The War Department is taking bids this week on 20,000 tons of shell forgings and shells located at different points in the East. We quote various grades of scrap for delivery at consumers' works as follows:

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel.....	\$15.00 to \$15.50
Scrap rails	15.00 to 15.50
Steel rails, rerolling.....	17.00 to 17.50
No. 1 low phos., heavy 0.04 and under	22.00 to 24.00
Cast iron car wheels.....	17.00 to 18.00
No. 1 railroad wrought.....	17.00 to 17.50
No. 1 yard wrought.....	15.00 to 15.50
No. 1 forge fire.....	13.00 to 13.50
Bundled sheets (for steel works).....	13.50 to 14.00
No. 1 busheling.....	15.00 to 15.50
No. 2 busheling.....	12.00 to 13.00
Turnings (short shoveling grade for blast furnace use).....	13.50 to 14.00
Mixed borings and turnings (for blast furnace use).....	13.50 to 14.00
Machine-shop turnings (for steel works use).....	13.50 to 14.00
Machine-shop turnings (for rolling mill use).....	14.00 to 14.50
Heavy axle turnings (or equivalent).....	13.50 to 14.00
Cast borings (for steel works and rolling mills).....	13.50 to 14.00
Cast borings (for chemical plants).....	16.50 to 17.50
No. 1 cast.....	19.00 to 19.50
Railroad grate bars.....	14.50 to 15.00
Stove plate (for steel plant use).....	15.00 to 15.50
Railroad malleable.....	15.00 to 15.50
Wrought iron and soft steel pipes and tubes (new specifications).....	14.00 to 14.50
Shafting	20.00 to 20.50

Railroad Equipment Business

The American Locomotive Co., New York, has booked the following new orders for locomotives: E. Atkins & Co., Cuba, 2 of the Mogul type; Norton Griffith & Co. for Insfectoria Federal Brazil, 3 four-wheel switching locomotives; Osceola Cypress Co., 1 Mogul type; Brownell Improvement Co., 2 four-wheel switching locomotives; Hammermill Paper Co., 1 four-wheel switching locomotive; Mansfield Sheet & Tin Plate Co., 1 four-wheel switching locomotive; South San Francisco Belt Line, 1 six-wheel switching locomotive; Central of Georgia Railroad, 2 mountain type; Central Railroad of Brazil, 1 Pacific type.

The Illinois Central has awarded repairs on 3100 box and automobile cars and 600 all-steel gondola cars. Of the box and automobile cars 1300 were let to the Streeter Car Co., 800 to the Pullman Co. and 500 to the Interstate Car Co. The remaining 500 will be repaired in the railroad's own shops at Burnside, Chicago. The repairs on the gondola cars were let to the Ryan Car Co.

The Chicago Great Western is inquiring for repairs on 500 stock cars. The Missouri Pacific is in the market for 250 ballast cars and the Western Pacific wants 2000 refrigerator cars.

Demonstration of Machinery

The third annual machinery demonstration given by Ogden R. Adams, dealer in machinery and equipment, Rochester, N. Y., was held this year on June 2 and 3, in Rochester. The exhibit was well attended by executives and master mechanics from points scattered over the State and the executives, for the first time in this series of demonstrations, exceeded in number the master mechanics and engineers in attendance. This was considered by many as indicating the close attention which executives are paying at this time to labor-saving equipment.

The demonstration was in charge of Mr. Adams, who was assisted as host by D. E. Doney, H. E. Galvin, R. F. Dumrese, Edward Beuhler, H. W. Gillette, F. C. Peartress and Mrs. J. E. Mason, officials and salesmen of the Adams organization. Machines of the following companies were demonstrated:

Abrasive Machine Tool Co., Providence, R. I.; W. F. &

FABRICATED STEEL BUSINESS

Bridge and Building Awards and Tonnages Pending at Leading Centers

Awards for fabricated steel work for the past week were as follows:

Wisconsin Steel Works, South Chicago, five-furnace open-hearth plant, 6500 tons, to American Bridge Co.

Northwest Paper Co., Cloquet, Minn., 1450 tons, to Pittsburgh Bridge & Iron Works.

Western States Gas & Electric Co., Eldorado development, California, 64 transmission towers, 400 tons, to Riter-Conley Co.

Witherbee, Sherman & Co., blast furnace, Port Henry, N. Y., 2000 tons, including castings, to Riter-Conley Co.

State of Iowa, three spans at Martins Station, 126 tons, to Pittsburgh-Des Moines Steel Co.

Worsted mill at Passaic, N. J., 100 tons, to American Bridge Co.

Thompson and Hughes Building, Tulsa, Okla., 1500 tons, to Mississippi Valley Structural Steel Co.

Whiting, Ind., Memorial Building, 150 tons, to Hansell-Elcock Co.

Lincoln Life Insurance Building, Fort Wayne, Ind., 1000 tons, to Lackawanna Bridge Works Corporation.

Memorial School, Salina, Kan., 200 tons, to St. Joseph Structural Steel Co.

Weldless Tube Co., Wooster, Ohio, 400 tons, to Massillon Bridge & Structural Co.

Structural Projects Pending

Inquiries for fabricated steel work which have appeared include the following:

Loft building, West Twenty-eighth Street, New York, 400 tons.

Public school, Coney Island, Brooklyn, N. Y., 700 tons.

Power house, Pine Grove, Pa., J. G. White Engineering Corporation, general contractor, 1000 tons.

Citizens Savings Bank, Bowery, New York, 400 tons.

Hospital building, Madison Avenue and 123rd Street, New York, 600 tons.

Gymnasium at Lafayette College, Easton, Pa., 400 tons.

Apartment house, East Forty-ninth Street, New York, 400 tons.

Apartment house, West Fifty-eighth Street, New York, 300 tons.

Tribuna Building, West Fortieth Street, New York, 500 tons.

Highway bridge at Williamsport, Pa., 1000 tons of structural steel and a tonnage of reinforcing bars.

Sinclair Oil Co., 35 oil storage tanks, 11,000 tons.

Sullivan Machinery Co., Michigan City, Ind., 2000 tons.

Addition to the department store of Rollman & Sons Co., Cincinnati, 700 tons of steel, 500 tons of reinforcing bars, bids taken.

American Shipbuilding Co., Cleveland, plant addition, 300 tons.

Addition to West Technical High School, Cleveland, 500 tons, bids taken.

Seventy-eight Twenty-eight Euclid Co., Cleveland, store and apartment building, 500 tons, bids taken.

Broadway Viaduct, Denver, 1700 tons.

John Barnes Co., Rockford, Ill.; Barnes Drill Co., Rockford, Ill.; Cincinnati Shaper Co., Cincinnati, Ohio; Bickford-Switzer Co., Greenfield, Mass.; Gisholt Machine Co., Madison, Wis.; Becker Milling Machine Co., Worcester; Skinner Chuck Co., New Britain, Conn.; Millholland Machine Co., Indianapolis; Manhattan Machine Tool Works, Grand Rapids, Mich.; Peerless Surfacing Machine Co., Troy, N. Y.; Peerless Machine Co., Racine, Wis.; Reed-Prentice Co., Worcester; Seneca Falls Mfg. Co., Seneca Falls, N. Y.; J. M. Ney Co., Hartford; Cross Bros. Co., Rochester; Kingsbury Mfg. Co., Keene, N. H.; Sipp Machine Co., Paterson, N. J.; Illinois Tool Works, Chicago; Burke Machine Tool Co., Conneaut, Ohio; Buffalo Forge Co., Buffalo; Syracuse Sander Mfg. Co., Syracuse; Sawyer-Weber Tool Mfg. Co., Los Angeles; Oesterlein Machine Co., Cincinnati; Universal Grinding Machine Co., Fitchburg, Mass.; Rochester Electrical Supply Co., Rochester; Whitcomb-Blaisdell Machine Tool Co., Worcester; Rockford Lathe & Drill Co., Rockford, Ill.; Triangle Tool & Die Co., Triangle Metal Products Corporation, Rochester; Electric Products Co., S. B. Roby Co., all of Rochester; Cleveland Twist Drill Co., Cleveland; Angle Steel Stool Co., Otsego, Mich.; Liberty Bread Slicer Co., Rochester; Wisconsin Electric Co., Racine, Wis.

THREE COMPANY MERGER

Details of the Plan Sent to Midvale, Republic and Inland Stockholders

A statement has been addressed to the stockholders of the Midvale Steel & Ordnance Co., the Republic Iron & Steel Co., and the Inland Steel Co., giving further details of the plan for the merger of these companies. The mechanism of the merger includes, first, a consolidation of the Midvale and Inland companies under the name of the North American Steel Corporation, which corporation acquires, subject to all liabilities, the assets of the Republic Iron & Steel Co. This method of procedure is adopted apparently in view of the fact that both the Midvale and the Inland companies are incorporated in Delaware.

It is stated that the issued capitalization of the North American Steel Corporation will be as follows:

Bonds and other fixed charge obligations.....	\$79,173,500
New preferred stock of \$100 par value.....	50,331,475
Shares of new common stock without par value..	3,309,612

The following statement concerning the capitalization, distribution of securities, fixed charges and earnings is taken from the circular:

"The \$79,173,500 bonds and fixed charge obligations will consist of \$60,599,500 bonds and guaranteed obligations of the Midvale company, or its subsidiaries; \$13,357,000 bonds and other obligations of the Republic company or its subsidiaries, and \$5,217,000 bonds and other obligations of the Inland company, all of which, in addition to the other liabilities of the three corporations, are to be assumed by the company.

"The \$50,331,475 preferred stock is to be 7 per cent cumulative and is to be convertible until July 1, 1934, into common stock at the rate of four shares of preferred stock for five shares of common. It is to be redeemable at the option of the company at 115 per cent and accrued dividends. Of the amount to be presently issued, \$25,000,000 par value is to be issued to provide in part for the acquisition of the properties of the Republic company, and \$25,331,475 par value is to be issued and the proceeds thereof, amounting to \$24,064,901, is to be paid by the company to the stockholders of the Inland company.

"The 3,309,612 shares of no par value common stock are to be issued as follows:

	Shares
To Midvale shareholders.....	1,500,000
To provide in part for the acquisition of the properties of the Republic Iron & Steel Co.....	510,000
To Inland shareholders.....	709,281
To be sold for cash.....	590,331

"On completion of the plan, each holder of one share of stock of Midvale company will be entitled to receive:

- (1) Three-fourths of a share of the new common stock; and
- (2) One-fourth of a share of stock of the corporation which is to take over the Nicetown plant.

"Each holder of one share of stock of the Inland company will be entitled to receive:

- (1) \$23.75 in cash and
- (2) Seven-tenths of a share of the new common stock.

"Each holder of one share of stock of the Republic company will be entitled to receive:

- (1) with respect to each share of preferred stock, one share of new preferred stock and an amount of cash necessary to provide for the then unpaid dividends on such preferred stock of the Republic company;
- (2) with respect to each share of common stock, 1.7 shares of new common stock.

"It is intended that a syndicate will be formed to provide for the cash requirements of the plan, including the provision of \$20,000,000 additional cash working capital, which will make the total working capital of the company over \$100,000,000. Kuhn, Loeb & Co. have agreed to act as bankers for the plan. The plan contemplates that the company will sell to Thomas L. Chadbourne, for services rendered 25,500 common shares at \$10 per share, and Kuhn, Loeb & Co., 59,500 common shares at \$10 per share.

"It is estimated that upon the consummation of the plan the fixed charges of the company will amount to \$3,913,085 per annum (which is about 74c. per ton of rated ingot capacity) and the preferred stock dividends to \$3,523,203 per annum (which is about 67c. per ton of rated ingot capacity). The total rated ingot capacity of the company will be 5,249,000 tons per annum.

"The book value as of Dec. 31, 1921 (which is far below the present replacement figures) of total net assets of the Midvale, Republic and Inland companies, including the \$20,000,000 new cash working capital (but excluding the Nicetown plant) totals about \$284,000,000.

"The earnings of these three companies (exclusive of the Nicetown plant earnings) applicable to dividends on the preferred and common stock, that is, after deduction of bond and other interest, Federal and other taxes and adequate depreciation, as compiled from the annual accounts for the ten years ending Dec. 31, 1921, averaged \$20,462,248 per annum and were as follows:

1912.....	\$7,435,421	1917.....	\$60,257,399
1913.....	10,164,892	1918.....	34,598,221
1914.....	3,379,545	1919.....	11,612,487
1915.....	13,702,110	1920.....	22,429,534
1916.....	52,595,325	1921.....(Loss)	11,552,446

"Since the year 1916 the three companies have expended more than \$120,000,000 for improvements and additional facilities, greatly increasing capacity and reducing operating costs."

The statement is signed by W. E. Corey, L. E. Block and John A. Topping, chairmen respectively of the Midvale, Inland and Republic companies. The plan is yet to be submitted to the Attorney-General and to the Federal Trade Commission and later is expected to be presented to the stockholders of the three companies for ratification.

Increased Sheet Mill Activity

YOUNGSTOWN, June 13.—Demand for sheets in the Mahoning Valley is such as to indicate about three months' capacity operations, makers report. The Brier Hill Steel Co. is preparing for resumption of rolling at its eight-mill Empire plant in Niles. At few times in many years has sheet production in the Mahoning Valley been carried forward at such a sustained rate as during the past two months. Resumption of the Empire plant will occupy Valley sheet capacity at a rate very close to normal.

Average operations in the Valley have expanded to 85 per cent.

The Youngstown Sheet & Tube Co. is placing its Hubbard plant, consisting of two blast furnaces, in readiness for operation. No definite arrangements have yet been made, however, for blowing in either stack, until the coal situation shows further improvement. The company is operating all four blast furnaces in its East Youngstown complement. In order to sustain its steel production, it will be necessary for the company to enlarge its iron output.

Railroad Workers Will Vote on Strike

Officials of the railroad brotherhoods, affiliated with the American Federation of Labor, at a meeting in Cincinnati on June 6-7, authorized the taking of a nation wide strike vote returnable on June 30 as an answer to the recent reductions made by the Railroad Labor Board affecting the shop crafts and maintenance of way men. The meeting was presided over by B. M. Jewell, president of the Railway Employees Department of the Federation. While Mr. Jewell refused to discuss the possibility of a strike, he said that the situation was very serious and that if the ballots authorize a strike, it would probably be called on July 1. Eleven unions are affected by the wage reduction, including the machinists' union, the boiler makers union, sheet metal workers, blacksmiths, electrical workers, carmen, clerks, maintenance of way men, telegraphers, stationary firemen and signalmen.

SOUTH AMERICAN MARKETS BUY

Japanese Rail Order Divided Between Imperial Works and Germany—Canadian Business Improves

NEW YORK, June 13.—Within the past few weeks there has been a marked falling off in the steel tonnage booked for export as compared with that of the earlier spring months. During the past week there has been very little activity. As has been reported for some time Japan is entirely out of the market from the standpoint of merchant buying and most of the current business is coming from South American countries, which, however, are buying from hand-to-mouth. Japanese merchants are evidently interested in making purchases here, judging by the few inquiries that are received from time to time, but the question of credit arrangements is an obstacle.

The recent purchase of the Nippon Oil Co., totaling 56,000 boxes of tin plate was divided between Mitsui & Co. and Takata & Co. The most recent rail purchase, that of the Tsushumi Railway Co., totaled about 6300 tons of 75-lb. rails and 300 tons of 60-lb. rails, which was divided equally between the Imperial Steel Works and the American branch of Suzuki & Co., which in turn placed the order for about 3300 tons in Germany with the Gutehoffnungshutte at Oberhausen, Germany.

Export Prices

Canadian business is improving and some consumers in the Dominion are anxious to contract for third

quarter, but so far American mills have been unwilling to make such contracts, particularly at the prices prevailing on Canadian business, which are at least \$2 per ton below the domestic quotations. Plates, shapes and bars are selling in Canada at about 1.50c. to 1.60c., Pittsburgh. On export lots of plates, shapes and bars to other countries, the c.i.f. price that is commonly quoted figures back to about 1.50c., Pittsburgh, although some mills are now trying to obtain 1.60c. per lb.

On sheets a wide spread exists between the c.i.f. prices at which the English mills are selling and what it would be necessary for American mills to do to meet their competition, this spread in some countries amounting to as much as \$10 or \$12 per ton. With the demand for sheets good in the domestic market, most of the mills are not willing to make this large concession even to keep their hold on foreign customers. Japan, although not purchasing sheets, is undoubtedly interested in buying here, evidenced by inquiries in the hands of one large Japanese export house, totaling about 1500 tons of Nos. 30, 30½, 31 and 32 gage. There are two inquiries of 500 tons each and several smaller ones of about 100 tons.

German purchases of electrolytic copper, which have been extremely heavy and are expected to continue so for some time, are probably for wire-making in a large majority of cases, as the copper being shipped is mostly in bars used for drawing into wire. German manufacturers of copper wire and other copper products are reported to be carrying on an active export business with European markets adjacent to Germany, which, during the war were largely exhausted of their copper products.

Steel Corporation's Unfilled Orders

The unfilled business on the books of the United States Steel Corporation as of May 31 last amounted to 5,254,228 tons, or 157,311 tons more than reported on the books April 30, and the largest amount reported since May, 1921. In April the unfilled business increased 602,769 tons, and in March 353,079 tons, while in February and January it decreased 100,609 and 26,736 tons, respectively. During the last month of 1921, it increased 17,872 tons. A year ago the unfilled tonnage amounted to 5,482,487 tons, or 228,259 tons more than on May 31, last. The monthly unfilled tonnage since January, 1919, compares as follows:

	1922	1921	1920	1919
Jan. 31.....	4,241,678	7,573,164	9,285,441	6,684,268
Feb. 28.....	4,141,069	6,933,867	9,502,081	6,010,787
Mar. 31.....	4,494,148	6,284,765	9,892,075	5,430,572
Apr. 30.....	5,096,917	5,845,224	10,359,747	4,800,685
May 31.....	5,254,228	5,482,487	10,940,465	4,282,310
June 30.....		5,117,868	10,978,817	4,892,855
July 31.....		4,830,324	11,118,468	5,578,661
Aug. 31.....		4,531,926	10,805,038	6,109,103
Sept. 30.....		4,560,670	10,374,804	6,284,638
Oct. 31.....		4,286,829	9,836,852	6,472,668
Nov. 30.....		4,250,542	9,021,481	7,128,330
Dec. 31.....		4,268,414	8,148,122	8,265,366

The largest total of unfilled orders was on April 30, 1917, when it was 12,183,083 tons. The lowest was on Dec. 31, 1910, at 2,605,747 tons.

Upward Price Tendency in Mahoning Valley

YOUNGSTOWN, June 13.—A number of independents in the Mahoning Valley have adopted the policy of accepting business for August and September delivery in the third quarter, but are not naming prices on tonnage for shipment beyond July. The market is characterized by continued firmness for all grades of sheets. Pressure for automobile sheets is especially firm, and premiums for delivery considerations are being offered by brokerage and warehouse interests in the Detroit district in particular.

The Newton Steel Co. has named a 4.75c. price on No. 22 gage auto body stock, for third quarter shipments, an increase of \$5 a ton above the 4.50c. level which applied on considerable second quarter tonnage. Much full finished tonnage was entered, however, by makers at 4.35c., involving delivery during the current quarterly period.

An example of the pressure for this grade of stock is in the offer of a Detroit broker to pay \$105 per ton

for 500 tons, or \$10 above the quoted price.

Prices in a general way are firm at current levels and are trending upward moderately. One Valley interest, for example, recently sold 2000 tons of heavy re-rolling billets at a price figuring to \$37, Pittsburgh.

More Buying of Foundry Iron

YOUNGSTOWN, June 13.—Following a period of little buying, there is renewed demand for iron from foundry interests, and the \$25 base price was upheld in several recent sales by Valley producers. One transaction at this price involved 2000 tons. A sale of low phosphorus washed metal at \$40 is recorded, with considerable unfilled tonnage of this grade on books of the maker.

The Trumbull-Cliffs Furnace Co. at Warren has completed arrangements for its coke supply next quarter and will therefore continue in operation. Since it was originally blown in Jan. 16 this stack has been supplied with coke from the by-product coke plant of the Youngstown Sheet & Tube Co.

The Sharon Steel Hoop Co., Sharon, Pa., has been a recent heavy buyer of pig iron until its Mary furnace at Lowellville can be blown in. Mattie stack at Girard of the A. M. Byers Co. and the merchant furnace of the Struthers Furnace Co. are ready to be blown in as soon as fuel supply can be arranged.

Will Install 25 Ovens

BIRMINGHAM, ALA., June 13.—The Alabama By-Products Co., through President Morris Bush, announces closing contract for the immediate installation of 25 additional ovens at its 50-oven Koppers plant in Birmingham. This will increase capacity 50 per cent. High-grade coal from Majestic and Imperial mines controlled by the operators enters into coke made at this plant and has gained for it a countrywide demand for product for foundry purposes.

The forging plant of the Pacific Construction & Engineering Co., Seattle, Wash., is to be offered for sale, the company now being in the hands of a liquidating committee for the benefit of its creditors. This is said to be the largest and most modern hydraulic and steam forging plant west of Chicago.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Plates

Sheared, tank quality, base, per lb. 1.60c. to 1.75c.

Structural Material

Beams, channels, etc. 1.60c. to 1.75c.

Iron and Steel Bars

Soft steel bars, base, per lb. 1.60c. to 1.75c.

Refined iron bars, base, per lb. 2.10c. to 2.20c.

Hot-Rolled Flats

Hoops, base, per lb. 2.40c. to 2.60c.

Bands, base, per lb. 2.40c. to 2.60c.

Strips, base, per lb. 2.40c. to 2.60c.

Cold-Finished Steels

Bars and shafting, base, per lb. 2c.

Strips, base, per lb. 4.00c.

Wire Products

Nails, base, per keg. \$2.40 to \$2.50

Bright plain wire, base, per 100 lb. 2.25

Annealed fence wire, base, per 100 lb. 2.25

Galvanized wire, base, per 100 lb. 2.75

Galvanized barbed, base, per 100 lb. 3.05 to 3.15

Galvanized staples, base, per keg. 3.05 to 3.15

Painted barbed wire, base, per 100 lb. 2.55 to 2.65

Polished staples, base, per keg. 2.55 to 2.65

Cement coated nails, base, per count keg. 1.90 to 2.00

Woven fence, carloads. 70 1/2 per cent off list

Bolts and Nuts

Machine bolts, small, rolled threads, .60, 10 and 10 per cent off list

Machine bolts, small, cut threads. 60 and 10 per cent off list

Machine bolts, larger and longer. 60 and 10 per cent off list

Carriage bolts, 3/4 x 6 in. 60 and 10 per cent off list

Smaller and shorter, rolled threads. 60 and 10 per cent off list

Cut threads 60 per cent off list

Longer and larger sizes. 60 per cent off list

Lag bolts 60, 10 and 10 per cent off list

Flow bolts, Nos. 1, 2 and 3 heads. 60 and 10 per cent off list

Other style heads. 20 per cent extra

Machine bolts, c.p.c. and t. nuts, 3/4 x 4 in. 60 and 10 per cent off list

Smaller and shorter. 50 and 10 per cent off list

Larger and longer sizes. 50 and 10 per cent off list

Hot pressed square or hex. blank nuts. \$4.50 off list

Hot pressed nuts, tapped. \$4.50 off list

C.p.c. and t. sq. or hex. nuts, blank. \$4.50 off list

C.p.c. and t. sq. or hex. nuts, tapped. \$4.50 off list

Semi-finished hex. nuts:

9/16 in. and smaller, U. S. S. 80 and 10 per cent off list

Small sizes, S. A. E. 80 and 10 per cent off list

S. A. E. 5/8 in. and larger. 80 per cent off list

Stove bolts in packages. 80 and 5 per cent off list

Stove bolts in bulk. 80, 5 and 2 1/2 per cent off list

Tire bolts 65 per cent off list

Track bolts in carloads. 3.00c. to 3.25c. base

Track bolts, less than 200 kegs. 3.50c. to 3.75c. base

Upset Square and Hex. Head Cap Screws

1/2 in. and under. 80 and 10 to 80, 10 and 10 per cent off list

9/16 in. to 3/4 in. 80 and 10 to 80, 10 and 10 per cent off list

Upset Set Screws

1/2 in. and under. 80, 10 and 5 to 85 per cent off list

9/16 in. to 3/4 in. 80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes 75 and 10 to 80 per cent off list

Milled Set Screws

All sizes 70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets, base per 100 lb. \$2.40

Large boiler rivets, base per 100 lb. 2.50

Small rivets 70 and 5 to 70 and 10 off list

Track Equipment

Spikes, 9/16 in. and larger, base, per 100 lb. \$2.25 to \$2.35

Spikes, 1/2 in. and smaller, base, per 100 lb. 2.50

Spikes, boat and barge, base, per 100 lb. 2.50

Track bolts, base, per 100 lb. 3.00

Tie plates, per 100 lb. \$1.75 to 2.00

Angle bars, base, per 100 lb. 2.40

Welded Pipe

Butt Weld

Inches	Steel	Black	Galv.	Inches	Iron	Black	Galv.
1/4	54 1/2	54 1/2	54 1/2	1/4 to 3/8	39 1/2	39 1/2	39 1/2
1/2	60	60	60	3/8 to 1/2	42 1/2	42 1/2	42 1/2
3/4	65	65	65	1/2 to 3/4	44 1/2	44 1/2	44 1/2
1	69	69	69	3/4 to 1 1/4	44 1/2	44 1/2	44 1/2
1 1/4	71	71	71				

Lap Weld

2	64	51 1/2	2	39 1/2	25 1/2
2 1/2 to 6	68	55 1/2	2 1/2 to 6	42 1/2	29 1/2
7 to 8	65	51 1/2	7 to 12	40 1/2	27 1/2
9 to 12	64	50 1/2			

Butt Weld, extra strong, plain ends

1/4	50 1/2	33	1/4 to 3/8	41 1/2	37 1/2
1/2	56	38 1/2	3/8 to 1/2	35 1/2	23 1/2
3/4	62	50 1/2	1/2 to 3/4	42 1/2	28 1/2
1	67	55 1/2	3/4 to 1 1/4	44 1/2	30 1/2
1 1/4	69	57 1/2			
2 to 3	70	58 1/2			

Lap Weld, extra strong, plain ends

2	62	50 1/2	2	40 1/2	27 1/2
2 1/2 to 4	66	54 1/2	2 1/2 to 4	43 1/2	31 1/2
4 1/2 to 6	65	53 1/2	4 1/2 to 6	42 1/2	30 1/2
7 to 8	61	47 1/2	7 to 8	35 1/2	23 1/2
9 to 12	55	41 1/2	9 to 12	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

Lap Welded Steel	Charcoal Iron
1 1/4 in. 26 1/2	1 1/4 in. 5
2 to 2 1/4 in. 41	1 1/4 to 1 1/2 in. 15
2 1/2 to 3 in. 52	2 to 2 1/4 in. 25
3 1/4 to 13 in. 57	2 1/2 to 3 in. 30
	3 1/4 to 4 1/2 in. 32

To large buyers of steel tubes a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

Discounts on cold-drawn or hot-rolled tubes in carload lots, f.o.b. Pittsburgh, follow:

1 in. 63	2 1/2 and 2 3/4 in. 46
1 1/4 and 1 1/2 in. 55	3 in. 50
1 3/4 in. 36	3 1/4 to 4 in. 55
2 and 2 1/4 in. 42	4 1/4 in. to 5 in. 47

Less carloads, 4 points less. Add \$8 per net ton for more than four gages heavier than standard. No extras for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be sold at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Tin Plate

Standard cokes, per base box. \$4.75

Terne Plate

(Per package, 200-lb.)

8-lb. coating \$9.30	25-lb. coating I. C. \$14.25
8-lb. coating I. C. 9.60	30-lb. coating I. C. 15.25
15-lb. coating I. C. 11.80	35-lb. coating I. C. 16.25
20-lb. coating I. C. 13.00	40-lb. coating I. C. 17.25

Sheets

Blue Annealed

Nos. 9 and 10 (base), per lb. 2.40c.

Box Annealed, One Pass Cold Rolled

No. 28 (base), per lb. 3.15c.

Galvanized

No. 28 (base), per lb. 4.15c.

Tin-Mill Black Plate

No. 28 (base), per lb. 3.15c.

Manufacturers have pamphlets, which can be had upon application, giving price differentials for gage and extras for length, width, shearing, etc.

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic. \$0.36	Buffalo \$0.295	Kansas City \$0.815	Pacific Coast \$1.665
Philadelphia, export. 0.265	Cleveland 0.24	Kansas City (pipe) 0.77	Pac. Coast, ship plates 1.235
Baltimore, domestic. 0.35	Detroit 0.325	St. Paul 0.665	Birmingham 0.765
Baltimore, export. 0.255	Cincinnati 0.325	Omaha 0.815	Memphis 0.43
New York, domestic. 0.33	Indianapolis 0.345	Omaha (pipe) 0.77	Jacksonville, all rail. 0.555
New York, export. 0.285	Chicago 0.33	Denver 1.35	Jacksonville, rail and water 0.46
Boston, domestic 0.405	St. Louis 0.475	Denver (wire products) 1.415	New Orleans 0.57
Boston, export 0.285			

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/2 c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery							
June	Copper, New York		Straits Tin	Lead		Zinc	
	Lake	Electro-lytic*	New York	New York	St. Louis	New York	St. Louis
7.....	14.00	13.75	32.50	5.85	5.50	5.70	5.35
8.....	14.00	13.75	32.12½	5.90	5.55	5.70	5.35
9.....	14.00	13.75	31.87½	5.90	5.55	5.72½	5.37½
10.....	14.00	13.75	...	5.90	5.55	5.75	5.40
12.....	14.00	13.75	31.50	5.90	5.60	5.77½	5.42½
13.....	14.00	13.75	31.00	5.90	5.60	5.77½	5.42½

*Refinery quotation.

New York

NEW YORK, June 16.

All the markets are quiet but prices are firm. Demand for copper has tapered off decidedly. There has been a moderate activity in tin at receding prices. Lead is the strongest market, with the tendency higher. The zinc market is quiet with prices firm.

Copper.—Demand for electrolytic copper, both from domestic and foreign buyers, is less than in some weeks and the prospects are that June sales will be lighter than in several months, May being recognized as the largest turnover since last fall. Thus far there has been no recession in prices and 14c., delivered, or 13.75c., refinery, appears to be the minimum for early and June-July-August delivery. Metal for prompt and June delivery is still somewhat scarce. Despite the quiet market, however, a fair business is reported from day to day.

Tin.—Sales of Straits tin, while not large in the past week, have been somewhat significant and have been put through very quietly. The bulk of the business, probably more than half, was sold to one consumer and one dealer at prices close to those quoted in the table above. Early in the week an interesting feature was good sales of Chinese tin around 31c. on one day for June-July shipment and, on another day, sales and offers of Chinese tin at 31c. to 31.12½c. On the same days Straits tin was sold at 32.25c. to 32.37½c., total sales on one of these days amounting to about 400 tons. On a later day 200 tons of Straits tin changed hands at 31.75c. for tin on steamers afloat, and at 31.87½c. for later shipments. On other days on the New York Metal Exchange 50 tons of Straits for June-July shipment was sold at 31.87½c. and 25 tons of April-May shipment at 31.62½c., with more offered. Yesterday and to-day have been very quiet, which is also true of Saturday. The market in general is heavy, due largely to the continued absence of any large buying by American consumers. The quotation to-day for spot Straits tin, New York, was 31c., with the London market at £150 5s. for spot standard, at £151 10s. for future standard, and at £153 15s. for spot Straits, all about £3 10s. per ton below values a week ago. Deliveries into consumption for the month of May were 4740 tons, with 1921 tons in stock and landing on May 31. Imports for the first five months of this year have been 23,480 tons, contrasting with only 7353 tons to June 1, 1921. Arrivals thus far in June have been 1045 tons, with 8755 tons reported afloat.

Lead.—The market is quiet but very firm with a steady movement into consumption. The leading interest on June 7 again advanced its prices from 5.65c. to 5.75c., New York, and from 5.45c. to 5.55c., St. Louis. In the outside market prices are considerably higher, with the minimum at 5.90c., New York, and 5.60c., St. Louis, for shipment from the West. These prices represent June delivery only.

Zinc.—The market for prime Western is quiet but strong. Demand for futures, particularly third quarter delivery, while not as heavy as very recently, is still of large enough proportions to maintain firm or advancing prices and the prompt delivery position is, if anything, stronger. For June or 30-day delivery prime Western is quoted at a minimum of 5.42½c., St. Louis, or 5.77½c., New York, and July and August deliveries

are selling at about the same level. Brass special brands have sold in fair volume as high as 6.12½c. to 6.25c. An interesting feature is the sale of prime Western for export to Belgium, an unusual circumstance. It is explained that the demand from Germany for Belgian zinc has been so large that Belgian producers of rolled zinc products, particularly sheets, have been obliged to make importations.

Aluminum.—The leading producer continues to quote virgin metal, 98 to 99 per cent pure, at 19c. to 19.10c., f.o.b. plant in 15-ton and larger lots, while imported metal for the same analysis is available from dealers at around 18c. to 19c., New York, duty paid.

Antimony.—Wholesale lots for early delivery are quoted at 5.25c., New York, duty paid, with the probability that on desirable business this could be shaded.

Old Metals.—The market is firm and business is active. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	13.50
Copper, heavy and wire.....	12.75
Copper, light and bottoms.....	11.00
Heavy machine composition.....	10.00
Brass, heavy.....	8.00
Brass, light.....	6.50
No. 1 red brass or composition turnings.....	8.75
No. 1 yellow rod brass turnings.....	6.75
Lead, heavy.....	4.75
Lead, tea.....	3.75
Zinc.....	3.00

Chicago

JUNE 13.—The metals are quiet with tin lower and zinc and lead higher than a week ago. The old metals are unchanged. We quote in carload lots: Lake copper, 14.87½c.; tin, 33c.; lead, 5.80c.; spelter, 5.65c.; antimony, 7.10c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 10.75c.; copper bottoms, 8.75c.; red brass, 8.25c.; yellow brass, 6.75c.; lead pipe, 4.25c.; zinc, 2.75c.; pewter, No. 1, 20c.; tin foil, 22.50c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

JUNE 13.—Lead held steady throughout the week at from 5.60c. to 5.70c. car lots, while slab zinc was steady at 5.25c. On old metals we quote: Light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c. aluminum, 9c.

Penn Seaboard-Carpenter Steel Merger Expected

Official announcement will probably be made shortly of a consolidation of the Penn Seaboard Steel Corporation, Philadelphia, and the Carpenter Steel Co., Reading, Pa. Officials of both companies are understood to have been working on the details of such a consolidation for several weeks. The Penn Seaboard Steel Corporation a few years ago absorbed the Tacony Steel Co., Tacony, Philadelphia, including an ordnance plant, which a subsidiary, the Tacony Ordnance Corporation, built for making guns during the war. In addition to these plants, which produce forgings, castings and alloy steel bars, the company owns plants at Chester, Pa., and New Castle, Del., which produce open-hearth steel castings, steel ingots and blooms and nickel and vanadium steel ingots. John B. Warren, former head of the Tacony Steel Co., is president of Penn Seaboard. The Carpenter Steel Co.'s products are chiefly steel for dies, cutlery, files, etc., nickel, chrome, tungsten and vanadium alloy steel. Its annual capacity is 16,000 tons of open-hearth steel, 17,000 tons of electric steel and 3500 tons of crucible steel, while that of the Penn Seaboard Steel Corporation, including the steel plant at Tacony, is about 165,000 tons annually.

May wage distribution by Youngstown, Ohio, industries, chiefly iron and steel plants, of \$4,222,021 is a gain of \$151,114 over the April payroll. It represents the largest wage disbursement in the district during the past 12 months.

British Iron and Steel Market

Engineers' Dispute Nearly Ended—Belgium Gets Large Finland Rail Order—Finished Steel Reduced (By Cable)

LONDON, ENGLAND, June 13.

An end to the engineers' dispute is expected immediately.

The pig iron market is quiet and cheap offerings made to America have gone unaccepted. Other export demand has diminished. Stocks of hematite iron are increasing, owing to less demand.

The foreign iron ore market is stagnant and Bilbao Rubio is nominally quoted at 26s. (\$5.81) ex-ship Tees.

The Steel Makers' Association has reduced home trade prices for finished steel 10s. (\$2.23). There is some demand but few orders are actually being placed. Export inquiry is broadening. South America is buying galvanized wire and Siam is inquiring for rails. Export prices are unchanged but concessions are possible.

Bolekow Vaughan & Co., Ltd., pig iron, steel and ferromanganese producers, have arranged a merger with Redpath, Brown & Co., Ltd.

Sales of continental material are increasing, with South America buying structural material. German plates have been sold to India with the latter country inquiring for hoops and Canada inquiring for rails. Belgium has secured an order for 15,000 tons of rails from Finland.

Tin plates have sold for 19s. 9d., (\$4.35) basis f.o.b. for prompt delivery, with buyers for forward delivery at 19s. 6d., basis f.o.b. There is a fair and continued export demand from all parts of the continent and also from South America, the Balkans and Scandinavia, but Far Eastern demand is quiet. Home consumers are buying moderately of July-August delivery and odd sizes have been done at 19s. 4½d., basis f.o.t.; sizes 20 x 14 have sold at 17s. 6d. f.o.t. and sizes 18¾ x 14 are quoted at 18s. 6d. f.o.b.

Galvanized sheets are steady but only small sales are recorded to South America, Australia and Germany. India is inquiring but bidding too low and the Far Eastern demand is stagnant. Sales of black sheets are increasing, business being done with South America and Roumania. Indian specifications are in request

from continental makers who are quoting £10 7s. 6d. f.o.b. with British makers asking £11 5s.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.47 per £1, as follows:

Durham coke, delivered	£1 7s.	to £1 8s.	\$6.03 to \$6.16
Cleveland No. 1 foundry	4 15		21.23
Cleveland No. 3 foundry	4 10		20.21
Cleveland No. 4 foundry	4 7½		19.55
Cleveland No. 4 forge	4 2½	to 4 5	18.43 to 18.99
Cleveland basic	4 10		20.21
East Coast mixed	4 15	to 4 16	21.23 to 21.45
Ferromanganese	15 0		66.95
Ferromanganese*	14 10	to 14 15	64.81 to 65.93
Rails, 60 lb. and up	7 17½	to 9 10	35.20 to 42.46
Billets	7 0	to 8 0	31.29 to 35.76
Sheet and tin plate bars.			
Welsh	7 7½		32.96
Tin plates, base box	0 19½	to 0 19¾	4.34 to 4.41
			C. per Lb.
Shin plates	9 5	to 10 0	1.80 to 2.00
Boiler plates	13 10		2.69
Tees	9 10	to 10 10	1.90 to 2.10
Channels	8 15	to 9 15	1.75 to 1.95
Beams	8 10	to 9 15	1.75 to 1.95
Round bars, ¾ to 3 in.	9 10	to 10 0	1.90 to 2.00
Galvanized sheets, 24 g.	15 12½	to 15 15	3.12 to 3.13
Black sheets	12 0	to 12 5	2.39 to 2.44
Steel hoops	12 0	& 12 5*	2.39 & 2.44*
Cold rolled steel strip,			
20 g.	23 2½		4.61
Cotton ties, Indian specifications	15 0		2.94

*Export price.

Continental Prices, All F.O.B. Channel Ports, Delivery as Specified

No. 3 foundry pig iron:			
Belgium, June	£4 12½s.	to £4 15s.	\$20.67 to \$21.23
Luxemburg, June	4 12½	to 4 15	20.67 to 21.23
France, June	4 12½	to 4 15	20.67 to 21.23
Basic pig iron:			
Luxemburg, June	4 6	to 4 7	19.14 to 19.44
Billets:			
Luxemburg, June	6 5		27.93
Lorraine, June	6 5		27.93
Wire nails (basis):			
Germany, August	0 14½		3.36
Wire rods, 5 mm. (0.2 in.):			
Belgium, June, July	7 5		34.72
Angles:			
Belgium, July, Aug.	7 10		33.52
Tees:			
Belgium, July	8 5		34.72
Channels:			
Belgium, June, July	7 10	to 7 12½	33.52 to 33.58
Merchant bars:			
Belgium, June, July	7 13½	to 8 0	1.50 to 1.60
Luxemb'g, July, Aug.	8 5 and up		1.60 and up
Germany, July, Aug.	8 7½		1.67
France, July	8 5	to 8 10	1.60 to 1.70
Joists (beams):			
France, July, Aug.	7 7½	to 8 0	1.50 to 1.60
Belgium, June, July	7 7½	to 7 15	1.50 to 1.55
Luxemb'g, June, July	7 15	to 8 0	1.55 to 1.60
Belgium, June, July	8 2½		1.60
3/16-in. plates:			
Germany, July, Aug.	9 5		1.85
Belgium, June, July	8 2½		1.62
No. 8 gage wire:			
Belgium, July, Aug.	14 10		2.89
Plates:			
Luxemburg, spot	8 10		1.70

Pig Iron Output and Demand Light—Finished Steel Orders in Reserve—Underground Railroad Contracts

LONDON, ENGLAND, June 1.—The disturbances in the industrial world continue to have an adverse effect upon any improvement in the iron and steel position. In fact, the home demand for pig iron is so stagnant that Cleveland ironmasters have had to shut down two blast furnaces, so that out of a total of 72 furnaces in the Cleveland district on all kinds of pig iron, only 25 are in operation. The little spurt of buying, which has been done by American producers, has, of course, been of great help as it is only export sales which have kept the furnaces going. Early this week there were further inquiries from your side, but the business does not seem to have matured, owing to expectations that the American coal strike will be over, and American pig iron cheaper before shipments from this side will have been completed. Our ironmasters are, however, hoping to get their costs down and were looking for some relief in reduced railroad rates, but these latter concessions did not come up to expectations. In the meantime production is all being absorbed and prices are firmly held, No. 3 Cleveland being quoted at 90s— for either home or export business. The demand for hematite has fallen away, home consumers buying practically nothing while foreign purchasers are showing less interest. As a result, prices have a weak

tendency and for East Coast Mixed Numbers, sellers ask about 95s.

That there are a lot of substantial home trade orders for finished iron and steel to be placed as soon as the engineering trouble is cleared up can be gathered from the numerous inquiries, showing that consumers generally have, up to the present, simply been going on from hand to mouth. One branch of consumption, however, has decided to act at once and contracts have been placed for the reconditioning of certain of the underground railroads of London, and that these are of importance to our manufacturers will be seen when it is shown that the steel required will amount to about 20,000 tons, while the iron tunnel segments will use up about 50,000 tons of iron. In addition there are large schemes at present being formulated for the electrification of certain of the railroads, one line alone proposing to electrify over 200 miles of suburban track which will naturally involve new rolling stock, etc. There is, therefore, the prospect of good employment for some time to come.

There has been a notable increase in export inquiry for various kinds of finished products but business as a whole hangs fire, manufacturers being still subject to a certain amount of continental competition, while in some cases it is stated that works cannot afford to continue selling at to-day's prices, and that when any substantial demand sets in, it would not be surprising to see shipment values advance.

PERSONAL

E. C. Collins will resign as vice-president in charge of traffic of the Pittsburgh Steamship Co., Cleveland, about July 1, to become associated with the Crucible Steel Co. of America as assistant to Horace S. Wilkinson, chairman of the board. He will be located in New York. Mr. Collins has been connected with the lake shipping industry since he started as an office boy with M. A. Hanna & Co. Five years later he went to the Carnegie Steel Co. when that company became engaged in iron ore and vessel trade and later with the Pittsburgh Steamship Co., being associated with the two Steel Corporation companies 25 years.

William L. Niekamp, who was elected president of the Iron, Steel and Heavy Hardware Association at its recent annual meeting in Washington, is president and general manager of the Beck & Corbitt Iron Co., St. Louis.



WM. L. NIEKAMP

Mr. Niekamp has been prominent in the association's councils and has been on its executive committee for several years. His business career has been connected entirely with his native city of St. Louis. He was first employed in 1892, after graduating at the age of 17 from St. Louis night high schools, with the Globe File & Hardware Co., of which his father was president. This company became in 1895 the Globe File & Iron Co., and in 1901 was consolidated with the Beck & Corbitt Iron Co., of which the elder Niekamp was president until his death in 1913. W. L. Niekamp succeeded his father as president. He is a director in the St. Louis Screw Co., Stiles Mfg. Co., R. C. Chipley Underwriting Co. and the United States Bank and vice-president of the Manufacturers' and Merchants' Association of St. Louis. He is an associate member of the American Iron and Steel Institute and of the American Society of Mining and Metallurgical Engineers.

E. J. Lowry, formerly metallurgist, Oliver Chilled Plow Works, South Bend, Ind., has become identified with Hickman, Williams & Co., pig iron brokers, as a service engineer. In that capacity his services will be offered gratis to foundries having any difficulties in solving the physical and chemical problems of their castings work. He will divide his time between the various offices of the company at Chicago, Cincinnati, Pittsburgh, St. Louis, New York, Philadelphia and Birmingham. His education and subsequent experience have been largely in the metallurgical field. After three years at the United States Naval Academy at Annapolis, he took up special work in metallurgy at Harvard University and the Massachusetts Institute of Technology. He was then for two years a foreman in the steel foundries of the United States Arsenal at Watertown, Mass., and later foundry foreman at the United States Cartridge Co., Lowell, Mass. As metallurgist for the Oliver Chilled Plow Works, he also was called in for consultation work at other plants, including those of the Ford Motor Co., Detroit; the Studebaker Corporation, South Bend, and the Walworth Mfg. Co., Kewanee, Ill.

J. W. McCabe has been appointed manager of the St. Louis branch of the Chicago Pneumatic Tool Co. He has been connected with the company for 20 years and has just returned from a three years' trip around the world for it.

Frank Oliver, sales manager at Chicago for the Greenfield Tap & Die Corporation, Greenfield, Mass., has been appointed eastern sales manager the Whit-

man & Barnes Mfg. Co., Akron, Ohio, with headquarters at New York.

William B. Gillies has been appointed general superintendent of the Mark plant, the Steel & Tube Co. of America at Indiana Harbor, Ind., to succeed A. H. Beale, recently elected vice-president in charge of operations.

Harry M. Wey has been appointed manager of the Chicago district of the Pittsburgh Testing Laboratory, with an office located at 1560 Monadnock Block. He entered the service of the Pennsylvania Railroad in 1900 in the office of the superintendent of motive power at Columbus, Ohio. Later he received additional motive power training with the Illinois Central and with the Atchison, Topeka & Santa Fe railroads. He was again employed in the mechanical department of the Pennsylvania Lines West of Pittsburgh from 1905 until 1909, when he entered the sales department of the U. S. Metallic Packing Co. Mr. Wey was also identified with the Industrial Car Manufacturers' Institute.

C. C. Ziegler, district manager the Greenfield Tap & Die Corporation, Greenfield, Mass., with headquarters at St. Louis, has been appointed Western sales manager at Chicago in charge of the territory west of Altoona, Pa., to the Dakotas, Nebraska and Kansas inclusive, succeeding Frank Oliver, who resigned to go with another company.

J. C. McQuiston, manager of publicity, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., delivered an address Tuesday, June 6, before the Pittsburgh Advertising Club on how the radio would likely be used in the future for advertising purposes. He said that the radio will be one of the leading methods of advertising in the near future, but that there was no danger that it would replace news and trade papers.

Roy C. McKenna, McKenna Brass & Mfg. Co., Pittsburgh, has been elected president of the University of Pittsburgh Alumni Association.

Howard C. Monroe has become associated with the Chamberlin-Roome Steel Co., jobber of iron and steel products, with warehouses at Thirty-ninth Street and Ashland Avenue, Chicago. Mr. Monroe, who has been identified with the iron and steel industry in Chicago for a number of years, recently returned from Pittsburgh to make his present connection.

Ralph Templeton, for several years manager of the Whitman & Barnes Mfg. Co.'s New York office and store, will assume an important position in the company's executive offices in Akron July 1. Mr. Templeton first entered the employ of the Whitman & Barnes organization in 1898 and has served it in various capacities continuously since that time.

J. W. Hemmerle, formerly manager of the machine tool department of the Fairbanks Co., has now become associated with L. A. Green, 1113 First National Bank Building, Pittsburgh, and will look after the machinery and equipment part of the business.

W. P. Clark, president Clark Tool Works, Inc., Belmont, N. Y., has returned from a five months' sojourn in the Philippine Islands in the interests of the Insular Lumber Co. of New York, of which he is also president.

V. A. Campbell, formerly associated with the South Bend Lathe Co., Boston, has become associated with Butts & Ordway Co., that city, heavy hardware, and will be in charge of its machine tool department.

R. P. Volkmer, who has been purchasing agent for the Tate-Jones Co., Pittsburgh, has severed his connection with that company and has become Cleveland sales representative of the Colonial Steel Co., Pittsburgh.

Sydney R. Mason, secretary of the Whitin Machine Works, manufacturer of textile machinery, Whitinsville, Mass., is expected to arrive home about the middle of this month from his several months' visit to Japan. Mr. Mason arrived in San Francisco on June 3.

Elbert H. Gary, chairman of the United States Steel Corporation, will deliver the address at the annual luncheon of the law alumni of Northwestern Univer-

sity, Evanston, Ill., on Saturday, June 17. The honorary degree of doctor of laws will be conferred on Judge Gary in connection with the commencement exercises of the University next week. He has been a trustee of Northwestern University for 30 years.

Dr. J. C. Hartzell was elected chairman of the Cincinnati Chapter, American Society for Steel Treating, at the annual meeting and dinner held at the Ohio Mechanic's Institute on June 8. A. L. Myers was elected vice-chairman and Fred L. Martin, secretary and treasurer. The executive committee for the coming year will consist of: Edwin Gardner, C. J. Wersel, C. H. Waldo, W. T. Powell and E. W. Detraz. In addition to the regular business of the meeting, J. C. Spence and C. H. Norton, of the Norton company, gave talks on the grinding of steel.

C. D. Rawstorne, for the past five years vice-president Freyn, Brassert & Co., blast furnace engineers, Chicago, has become identified with the Riter-Conley Co., with headquarters at Pittsburgh, as contracting engineer, specializing in blast furnace and steel mill construction.

E. J. Burnes, who for four years has been connected in a selling capacity with Alley & Page, New York, has resigned to join Pilling & Co.'s New York pig iron department.

R. E. Nelles, formerly with the Girtanner Engineering Corporation and Ford, Bacon & Davis, Inc., New York, has been appointed manager of the New York office of the Cleveland Crane & Engineering Co., 50 Church Street, in charge of sales of the Cleveland tramrail, succeeding L. E. Salem. S. F. Joor, formerly of Meade-Morrison Mfg. Co. and the Link Belt Co., has been appointed to the new Chicago office of the Cleveland company, at 1418 First National Bank Building. District managers in the Detroit, Chicago and New York offices will, in the future, confine their efforts to sales of the Cleveland tramrail, sales of cranes being handled directly from Cleveland by J. B. Shaver, sales manager of the crane department.

President James A. Farrell of the United States Steel Corporation received the honorary degree of doctor of laws at the annual commencement of Georgetown University, Washington, on Monday, June 12.

James Walsh, superintendent rolling mills, Illinois Steel Co., South Chicago, Ill., has resigned to become assistant general superintendent Inland Steel Co., at Indiana Harbor, Ind.

E. G. MacKay has retired as superintendent of the steel plant of the Nova Scotia Steel & Coal Co., Sydney Mines, N. S., and will leave shortly for Pittsburgh, where he is expected to take an important position.

F. A. Thomas has resigned as president the Delphos Ice Machinery Co., Delphos, Ohio, and has been succeeded by H. L. Leilich, former vice-president, manager and treasurer. The latter will continue to serve as manager. L. C. Allinger has been elected treasurer and J. A. Carpenter, vice-president.

Announcement has been made by the Wheeling Steel Corporation, with plants in Wheeling and Beach Bottom and Benwood, W. Va., Martins Ferry, Yorkville, Steubenville and Portsmouth, Ohio, of an advance in the wages of all workmen paid on an hourly basis. Construction laborers have been getting 22c to 25c an hour and those in the mills 27c.

No. 2 blast furnace, Pittsburgh Steel Co., Monessen, Pa., which was blown out in May for relining, resumed operation on Wednesday, June 7. The company bought some coke for this stack in the open market, but did not pay \$7 per ton for it, as reported.

An open competitive examination for instrument makers is to be held by the United States Civil Service Commission. Applicants should apply for form 1312, either to the Civil Service Commission at Washington or to the commission's offices in post office buildings in the leading cities of the country.

OBITUARY

ADOLPHUS CLAY BARTLETT, chairman of the board Hibbard, Spencer, Bartlett & Co., one of the largest hardware jobbing firms in the world with headquarters at Chicago, died May 30 at Pasadena, Cal., following a stroke of paralysis. Mr. Bartlett would have been 78 years of age had he lived until June 22. Nearly 59 years of his life was spent in the hardware jobbing business. He was born at Stratford, N. Y., June 22, 1844, and came West to Chicago at the age of 19. There he entered the employ of Tuttle, Hibbard & Co. as an office boy. Later he was given an interest in the firm and in 1882 the company was incorporated under the present name of Hibbard, Spencer, Bartlett & Co. At that time he was made secretary of the company, and on the death of Mr. Spencer he became vice-president. When Mr. Hibbard died he was elected president, which position he held until January, 1914, when he was elected chairman of the board.

GEORGE D. SELDEN, president Erie City Iron Works, Erie, Pa., one of the best known foundrymen in the East, died at his home Monday, June 5. His death came during the night and was unexpected. He was born at Erie on April 21, 1847. At the age of 19 years, he took a subordinate position with the Erie City Iron Works, which was controlled by members of his family. He in time reached the position of treasurer, later vice-president and since 1895 had been president of the company. He was known for his philanthropic work.

GEORGE H. MORRIS, member of the firm of E. K. Morris & Co., iron and steel merchants, Cincinnati, died at his home in that city on May 29. Mr. Morris was 68 years old and is survived by his wife, one son and one daughter. He had been in ill health for more than a year.

JOHN K. WILSON, SR., of the John K. Wilson Co., hardware manufacturers' agents, Baltimore, Md., died May 28.

IRA B. LESH, president Ferguson Furnace Co., Toledo, Ohio, and general superintendent of the Railway Materials Co., Chicago, died May 22 at his home in Toledo.

CHARLES C. DAVIS, manager Kingsbury & Davis Paper Box Machine Co., Contoocook, N. H., died at his home there June 3. He was born in Hopkinton April 13, 1860.

R. T. HAZELWOOD, president Rundle Mfg. Co., Milwaukee, died in the Mercy Hospital, Chicago, last week after a prolonged illness. Mr. Hazelwood was 53 years of age and was a native of Wisconsin, born at Oconomowoc. He was also president of the Wisconsin Sanitary Mfg. Co. and of the Gas Tank Recharging Co.

Edgar Thomson Works Again Wins Safety Prize

Maintaining the high record in accident prevention made last year, when the Edgar Thomson Steel Works of the Carnegie Steel Co. at Braddock, Pa., proved to be the safest operating plant in the company, the plant has been awarded the safety trophy of Carnegie Steel Co. for accident prevention in May. The Edgar Thomson Works went through the month of May without a serious accident. The Braddock plant has consistently led the Carnegie Steel Co. plants in accident prevention for several years, and the conditions under which the trophy is awarded were for that reason severe, as they demand that the competing plant shall show a greater improvement over its own record in accident prevention during the last five years than any other plant. O. J. H. Hartsuff, general superintendent, attributes the splendid record to the good work of the safety department under Supt. John B. Trusel, and to the interest and co-operation of every workman in the plant.

BOILER MAKERS MEET

National Inspection Board for Helping the Broad Acceptance of A. S. M. E. Code

Reports from representatives in the American Uniform Boiler-Law Society and in the National Board of Boiler and Pressure Vessel Inspectors came in for special attention at the annual convention of the American Boiler Manufacturers' Association, held at the Buckwood Inn, Shawnee-on-Delaware, Pa., June 5, 6 and 7. Addresses were also made by M. W. Alexander, managing director National Industrial Conference Board, New York, by E. C. Fisher, Wickes Boiler Co., Saginaw, Mich., covering a study of thickness of shell plates in return tubular boilers, and by R. Sanford Riley, president Sanford Riley Stoker Co., Worcester, Mass., who presented motion pictures of what goes on with a Riley underfeed stoker. E. R. Fish, Heine Boiler Co., St. Louis, and Charles E. Gorton, Gorton & Lidgerwood Co., New York, discussed the boiler code development and Joseph F. Scott and C. O. Myers, chairman and secretary-treasurer, respectively, of the National Board of Boiler and Pressure Vessel Inspectors, devoted themselves to this relatively new organization for promoting uniformity in regulations affecting official acceptance of boilers.

In his opening address President A. G. Pratt, Babcock & Wilcox Co., New York, ventured the prediction that next year "we shall have considerably better business than during the year 1922," after admitting that so far this year the business volume has been materially better for the same period of 1921. He dwelt at length also on the desirability of co-operation with the Department of Commerce, recounting in some detail the meeting of trade association executives and the Department of Commerce on April 12.

Mr. Fish, in discussing the continuing work on revising the A. S. M. E. boiler code as changes in the state of the arts require, devoted himself at length to the questions arising over air tanks and pressure vessels, more generally known as unfired pressure vessels. "The great variety of purposes for which pressure tanks of all sorts are used and the fact that welding is a method of construction extensively employed, coupled with the great difference in practice and opinion of manufacturers, has made the settlement of the question," he said, "exceedingly difficult. The question of welding," he continued, "was referred to the subcommittee on welding, which has been co-operating with the American Welding Society. A number of hearings have been held and much progress has been made. At times it seemed as though a reconciliation and even an approximate agreement could hardly be expected, but by being patient and taking time there is every evidence to support the belief that a constructive and generally acceptable code will be forthcoming."

Goal of One Stamp for Boiler Acceptance

Mr. Gorton, chairman American Uniform Boiler-Law Society, after recounting the labors with State and city authorities over the adoption and continuing operation of the A. S. M. E. boiler code, took up the question of the National Board of Boiler and Pressure Vessel Inspectors. This was organized for a single stamping of approved boilers to obviate stamping for every State into which a boiler would likely have to go. It appeared that not enough boiler manufacturers registered their products with the national board to make the board self supporting and the sentiment was general that the fee, \$2 per boiler, should be reduced as soon as possible, the amount of it being seemingly an obstacle.

"Eleven or twelve States," Mr. Gorton said, "have already recognized the national board stamp, so that instead of placing half a dozen State stamps or more, as heretofore, on a boiler, it is only necessary for the maker to register his name with the national board, through C. O. Myers, secretary-treasurer, Comstock Building, Columbus, Ohio, who assigns a number and facsimile stamp. Last year," he added, "there were

some 29 bills introduced in the legislatures of the United States that directly or indirectly affected the Boiler Inspection Department." He hoped some way could be found by which the national board can be financed until the time comes when it will be self-supporting. His plan is to have \$2,500 or \$3,000 raised by the manufacturers and the national board may then, once a year, have a national convention, "and if this fund can be raised I don't believe there will be any necessity of ever coming back to this organization or any other and ask for funds."

Joseph F. Scott, chairman National Board of Boiler and Pressure Vessel Inspectors, and C. O. Myers, secretary-treasurer, entered into the discussion. Mr. Scott said that as revisions of the boiler code are now going on and as changes in various paragraphs are being made, interpretations of the changes can be disseminated throughout the country more uniformly, through the members of the national board. "We have in mind now a revision of the fees," he said, "rating them in proportion to the size of the boiler manufactured, that is, so much per horse power."

Mr. Myers said: "We have estimated that there are 20,000 to 25,000 new boilers built annually. This includes all types and sizes, and if they are all registered with the national board the fee per boiler could be reduced to a very small amount. The fee was fixed at \$2 per boiler at the start in view of the fact that it is a much easier matter to reduce it than it would be to raise should we find it was not sufficient to pay the expenses."

"The following States have shown a spirit of co-operation by officially approving of boilers bearing the national board stamp. By taking such action they have paved the way for the boiler builders to simplify the marking of their products: Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Ohio, Indiana, Wisconsin, Minnesota, Oklahoma, Oregon, California, Arkansas, Utah, and the cities of Chicago, St. Louis and Nashville, Tenn., Scranton, Erie and Allegheny County, Pa., will accept boilers bearing the national board stamp, and Philadelphia is shortly expected to."

"The records show that there are 45 boiler manufacturers qualified to use the national board stamp and that 14 have started using it, and the major portion of these only on one or two occasions."

The meeting concurred in a report of a joint committee of the American Boiler Manufacturers Association and the Stoker Manufacturers' Association, recommending that when I-beam or other supports are required to carry front boiler walls, either vertical or inclined, these should be furnished by the boiler manufacturer, and that stoker manufacturers should erect and connect all water backs, including blow-off piping and valves, required in that connection, regardless of by whom furnished. It is also the expectation that stoker manufacturers will in all instances, except for side-feed and chain grate stokers, furnish a lower front to a height of 6 ft. from the boiler room floor level and to the full width of the boiler setting, the boiler manufacturers to bring their fronts down to a point 6 ft. above the boiler room floor.

Syndolag Patents Sustained

The syndolag patents owned by the Allen S. Davison Co., Pittsburgh, were sustained by the United States District Court in Williamsport, Pa., June 8. Some time ago, a bill of complaint was filed by the Davison company against the J. E. Baker Co., York, Pa., to restrain it from using the syndolag process in the making of magdolite. In the testimony of the complainant at the trial in Williamsport, the defendant admitted having used this process, but stated that it now had discontinued the practice, and did not intend to use it any further. Whereupon a decree was entered sustaining the validity of the patents, and directing that an injunction be issued restraining the J. E. Baker Co. from any further infringement of the syndolag patents. This is a decisive victory for the Davison company and ends this extended litigation.

American Foundrymen Meet at Rochester (Continued from page 1666)

In his opinion, the first important advance in open-hearth practice began about three years ago with the application of what is known as the blow-torch principle to the open-hearth furnace, in which the fuel and air are mixed more efficiently before they enter the hearth so as to obtain complete combustion. The results of this arrangement, according to the author, are reflected in greater furnace output, increased thermal efficiency and more accurate control of melting temperature. At the same time, a higher percentage of scrap can be used and the output of the furnace greatly increased, as well as the attaining of an improvement in the quality of the metal.

Regenerators of insulated brick encased in steel plate work were also described as a radical departure from conventional design, and the plan was also discussed of locating gas producers nearer the furnace conducting the gas in suitable steel mains to the ends of the furnaces and introducing it into the air uptakes without regeneration.

In closing the presentation of his paper Mr. McKee said "That while the repairs on a blow torch furnace are higher in the hearth, they are a great deal lower below." He also stated that he had been told very recently that in one case the cost of repairs by the use of such a furnace had been actually reduced to one-fourth what they were in 1914.

In response to a question from R. A. Bull as to what effect a blow torch furnace had upon the life of the roof, Mr. McKee replied that the effect was that the excess temperature was felt on the front and back walls and not on the roof; that the tendency of the flame was rather away from the roof. In his opinion this furnace was a new instrument, about the use of which not much is yet known, but the future of which he considered very important. He added that whereas formerly heats of 80 tons were the largest possible, one plant was now making 95 to 100 tons in the same furnace because of the absence of a foaming.

Oil as a Fuel in the Blow Torch Furnace

The question of the application of the blow torch principle to oil as a fuel was raised and Mr. McKee said that he did not know much about this phase of the subject, as it had been largely used only on furnaces using coke-oven gas and tar, producer gas and natural gas, but he felt that the principle would apply on oil furnaces with the same result.

Edwin F. Cone, associate editor THE IRON AGE, New York, in referring to the oil-burning phase of the subject and the application of the Egler or McKune furnaces to the steel foundry industry, called attention to data published last December ("Fuel Used in Open-Hearth Furnace," in THE IRON AGE, Dec. 23, 1921), in which it was shown that over 67 per cent of the open-hearth output of the steel casting industry was made with oil as the fuel. He called attention to the importance of Mr. McKee's paper and said that this could hardly be exaggerated. In regard to the higher temperatures in such furnaces and the question of refractories which would stand such temperatures, he said that he had been informed recently of striking developments in the brick industry involving the manufacture of brick based upon chemical principles which seemed to promise a brick which would stand high temperatures. He held that this was one of the new developments which would be a factor in the improvement of open-hearth furnaces performance coupled with the application of the blow torch principle. Another matter not to be lost sight of, he thought, was one of the statements of the author of the paper that better steel would result. It is well known that in the electric furnace better quality is due in part to the higher temperatures and it would seem that, in basic open-hearth furnaces, the result of higher temperatures would mean a greater degree of refining and a better product and the possibility of more generally realizing quality steel in quantity.

Oxy-Acetylene in Steel Foundries

"A Managerial Study of Oxy-Acetylene Cutting and Welding in Foundries" was presented in abstract by

the author, G. O. Carter, Linde Air Products Co., New York. He recommended piped oxy-acetylene installations for large foundries, and outlined some of the advantages from such an arrangement. Among these were the doing away of the handling of tanks and the insuring of more regular inspection and careful maintenance, as well as less loss of the gases. Among the author's items of recapitulation are as follows:

In the larger foundries a new type three-section oxygen manifold will pay rich dividends on the investment and provide oxygen for welding at almost no cost.

The managerial phase of gas cutting and welding is as important as the technical phase in securing maximum efficiency and economy.

Repair welding in the foundry is well worth while and should be under the supervision of the master mechanic rather than under a production official.

Oxy-acetylene cutting of cast iron is often a useful operation but it is not economical for regular cutting of risers in gray iron foundries.

New uses of oxygen and acetylene are being discovered almost daily and foundries can well afford to follow the lead of steel mills in adopting many of the new uses and practices.

Segregation of castings according to the sizes of the riser necks may be counted on to more than repay the expense incident to such segregation.

A New Welding Rod

In the brief discussion which followed, the author in response to the question as to the best rod for welding castings stated that a research had just been completed by the company's laboratory which had developed a new rod containing 0.65 per cent manganese and 0.80 silicon with the carbon contained running from 0.13 to 0.18 per cent. He said that welds made with a rod of this composition had been found to be clean, the presence of the silicon preventing the oxygen uniting with the iron. In his opinion the usual Norway iron was not strong enough and in the use of ordinary steel rods it frequently happens that much of the carbon is burned out.

A. S. Kinsey stated that he had found oxy-acetylene excellent for steel casting either for repairing or welding, as well as for the cutting of cast iron, but so far as the repairing of malleable castings was concerned it developed in the discussion that no real solution of this problem had yet been reached, although the successful use of Tobin bronze was cited. As to the cost of cutting cast iron, Mr. Carter stated that the ratio between that and steel was about five to one, or in other words, to cut 100 sq. in. of cast iron requires about \$2.50 for gas and labor as against 50 cents for steel.

Steel Foundry Sands

An important paper, entitled "The Preparation of Steel Foundries Sands," was read from manuscript by the author, S. H. Cleland, National Engineering Co., Chicago. One of the many interesting points brought out by the author was his contention that the excessive grinding of silica grains so as to crush them, and also the lack of uniform grain size in facing sands, was one of the causes of bad castings. In his opinion mulling machines are a corrective for this condition, the grinding machines more usually producing the crushing effect.

In discussing the use of heap sand and the economy therefrom, he did not believe it possible to use this to the extent of 90 per cent, insisting that the continual reheating of the grains often changes them, even resulting at times in a fused sand. Another important point brought out by the author was his prediction that the time will come when the production of synthetic sand for foundry purposes would be realized, it having been demonstrated in this connection that there exists in one or two places material which will not fuse at 3200 deg. Fahr.

R. F. Harrington, Hunts Spiller Mfg. Co., Boston, testified to the efficiency of the mulling action in the preparation of sand, and also stated that an intensified supervision of the mixing of sands and the obtaining of a uniform sand was one of the most important problems before steel foundrymen.

H. B. Taylor said that he had attended nearly every meeting of American foundrymen and that this meeting was the first one at which there had been any dis-

cussion of the sand problem which he could recall. Mr. Cleland in closing the discussion predicted great progress in the future development of our knowledge of foundry sands, stating that this would be more extensive in the next 10 years than it had been in the last 50.

Electric Heat in Foundries

Another paper, not preprinted but presented by abstract by the author, was entitled "When and Where Foundries Should Use Electric Heat," by E. F. Collins, General Electric Co., Schenectady, N. Y. The author omitted the application of electric heat to the melting of steel and confined himself to its use for normalizing and annealing of cast iron and steel and for reheating purposes. He spoke particularly of the use of electric heat in making malleable castings as well as for annealing them, and said there were some advantages in the latter case worth consideration. Although no extensive practical work has been done in this line, he said that the results of tests and experiments show that it is possible to reduce the cycle for annealing malleable castings so that the average time of 120 to 180 hr., ruling in present practice, could be cut down to 70 or 80 hr. and that charts in the paper show the details. Although the relative cost compared with oil was larger, he believed that the advantages offered were so great that the total cost is negligible. There was also the consideration of increase in tensile strength.

Specifications for Steel Castings

The report of the committee on specifications for steel castings was presented by R. A. Bull. He stated that this was the result of nearly two years' work as applied almost entirely to specification for railroad steel castings. He said that it has been determined that there was no true elastic limit for cast steel, but that the yield point or drop of the beam had been recommended as standard. He mentioned a maximum of 0.85 per cent for manganese for such castings and a maximum of 0.05 per cent for both phosphorous and sulphur. He stated that the question of heat treatment had been gone into and that also certain recommendations had been made regarding methods of analysis. The committee had also taken up the subject of foundry specifications for foundry pig iron and called attention to the possibility that the variations as proposed were possibly too wide. His report was not available in printed form but will appear later and the question will come up at the annual meeting of the American Society for Testing Materials at Atlantic City, the last week in June.

C. S. Koch brought up the important question as to

whether these railroad casting specifications when adopted would apply ultimately to all steel castings and stated he regarded this a very important consideration. No action, however, was taken on this point.

Sulphur and Phosphorus in Rivet Steel

A brief abstract of the preliminary report of the Joint Committee at an investigation of phosphorus and sulphur and steel, with particular reference to the effect of sulphur on rivet steel, was presented by R. A. Bull. Because this report is a part of the program of the Testing Society's meeting in June, the discussion was limited to a few brief statements, among which was the fact that the same program was to be carried out on steel castings, although shear tests would probably be omitted.

New Electric Furnace

A paper, presented only by title, by R. Sylvany, of France, entitled "A New French Electric Furnace," describes a new melting medium constructed with the idea of insuring good purification by direct passage and uniform distribution of the current through the metal and slag. The furnace was designed by T. Levoz and is really a crucible with a single opening for charging and pouring. The electrode is placed in a sheath to shut out air currents and small section metal conductors are used to afford a more uniform circulation. Before describing this furnace the author comments upon the characteristics of several other leading steel melting furnaces used in France.

"Tests with Cerium in Red Brass and as a Deoxidizer and Desulphurizer in Red Brass, Cast Iron and Converter Steel," by L. W. Spring, Crane Co., Chicago, was also presented only by title. The author in referring to the use of cerium on cast iron stated that the metal showed greater shrinkage in the gate than untreated iron and that from the tests on converter steel it seemed probable that cerium has the important effect of increasing elongation and reduction of area and reducing the sulphur without affecting the percentages of any other metalloid. Photomicrographs are reproduced to indicate that the specimen treated with cerium is cleaner steel than the untreated specimen, the manganese sulphides, oxides, etc., having been removed.

Two other papers presented only by title in the absence of the authors or a representative were "Electric Cranes in Foundry Service," by A. H. McDougall, Whiting Corporation, Harvey, Ill., and "Analysis Control in Acid Electric Steel Practice," by A. C. Jones, Electric Steel Co., Chicago.

Technical Papers on Malleable Cast Iron

THIS session, the last one of the convention, held Friday morning, June 9, had on its schedule 8 papers and reports. It was presided over by C. R. Messinger, vice-president of the association.

Brick for Air Furnaces

The first paper was "The Manufacture and Properties of Refractories for Air Furnaces," by C. E. Bales, Louisville Fire Brick Works, Louisville, Ky. Mr. Bales treated the subject first from a historic standpoint, then from the angle of manufacturing or from the mining of the fire clay to the shipment of the finished brick. He used lantern slides showing many of the phases of mining and manufacturing. He advocated the use in malleable iron foundries of a thicker bung brick than now in common use. Increasing the thickness from 2½ in. to 3 in., he said, meant the maker could turn out straighter brick truer to size and, due to the greater strength, fewer will be broken during the time of transportation and unloading. In building the bungs, some time can be saved because fewer brick will be required; also the number of joints between the brick will be reduced and less fire clay mortar is required.

Closely associated with Mr. Bales' paper was one by H. G. Schurecht, Ceramic Experiment Station, Bureau of Mines, Columbus, Ohio. This paper detailed the results of a study of the relation of laboratory tests of brick for malleable iron furnace bungs to the ability

of the brick to stand up under operating conditions. The tests indicated that fire brick for malleable furnace bungs should be strong enough to support the arch at high temperatures, but not strong enough to stand as high a load and fusion test as is required of No. 1 fire bricks. The author believed the spalling test bore a close relation to the service tests, but that the load and softening tests were not reliable guides to the behavior of the brick in service. Carborundum brick, it was pointed out, stood more heats than fire clay brick, but were not as satisfactory because of their high heat conductivity and great weight.

A European View of Malleable Iron

An international exchange paper was entitled "A European View of the Malleable Problem," by T. Levoz, Auxonne, Cote d'Or, France. In answer to what is a suitable metal the author observes:

It is understood to be that which, when cast, flows over the sand on contact with it without attacking the organic matter. It is understood that the metal must combine the mechanical conditions and characteristics required. In order that the metal shall flow over the sand its iron oxides must previously be reduced and, if they are not reduced completely,

It is preferable that they should be in the ferric rather than the ferrous state. Many foundrymen are imbued with the idea that a metal cast too hot prevents the scraping of the sand on contact but this is a mistake. Of course, apart from the question of pipes and shrinkages, a perfectly deoxidized metal may be cast at a maximum temperature without attacking the organic matter of the sands generally employed in iron, malleable or steel foundries. The error chiefly is noticeable among founders of cast steel who often regard a dazzling hot metal as being too hot, even when it is greatly superoxidized. The purpose of these remarks is to point out to founders of malleable iron that their interest is not only to study the part played by the carbon, silicon, manganese, sulphur and phosphorus but that they have invariably neglected the part played by the principal factor—the iron oxide—which is the source of all their troubles and disappointments. It is, in fact, the greater or less degree of oxidation of iron that governs the temperature of the bath and, consequently, its composition. Generally, whether it is a question of ordinary cast iron, of malleable iron or of cast steel in which the oxidation of the iron plays the most important part, it is necessary to have the initial metal at the maximum temperature so as to facilitate all the reactions necessarily arising from the presence, in larger or smaller quantities, of ferrous or ferric oxides. It is easy to determine the presence of either of these oxides in liquid metal containing only iron and carbon with a minimum of silicon and manganese. Metal containing ferrous oxides boils violently in presence of carbon and liberates graphite carbon at the moment of solidification because all boiling causes cooling.

Carbon Dioxide Recorders and Powdered Coal

D. M. Scott, T. H. Symington Co., Rochester, N. Y., who presented a paper on "Use of Carbon Dioxide Recorders Controlling Combustion of Powdered Coal," said in part:

Powdered coal, at rest in the furnace-receiving hopper, displays some of the characteristics of a fluid in that it will flow and will yield to a slight pressure. In certain types of feeders, the coal flows by gravity through an orifice into a current of air. Unfortunately, powdered coal does not possess either of these characteristics with the necessary consistency and it is therefore essential that feeders and mixers for powdered coal be carefully designed with due regard for these somewhat erratic properties. When aerated the particles of coal being heavier than air develop a different velocity under certain conditions. When in a mass the coal will at times develop sufficient friction between the particles to give a high angle of repose. It is for these reasons that the conditions necessary for perfect combustion, a constantly uniform and complex mixture of coal and air, can be obtained only by intelligently designing and operating the feeding and mixing equipment. Where combustion takes place in a large chamber a certain amount of fluctuation in the ratio of coal and air is not so detrimental, but in a melting furnace where a high flame temperature is essential the thermal efficiency will be decidedly increased if the air and coal ratio is uniformly maintained within close limit of accuracy.

In the malleable foundry of the T. H. Symington Co., Rochester, said the speaker, one man regulates the burners on twenty-one 80-ton annealing ovens and,

as the distance between the first and the last is 500 ft., the coal feed may be interrupted for some time before the oven tender might locate the trouble. It was with a view to locating these interruptions immediately, as well as maintaining the necessary constant mixing of coal and air that carbon dioxide recorders were applied to the annealing ovens. The success of the recorders on the annealing ovens led to their application to the melting furnaces where they now are used to maintain a closer control of combustion. He also said that while an analysis of flue gas by Professor Trinks had disclosed that 18.66 per cent CO₂ measured perfect combustion of Pittsburgh coal, a rate of 19 per cent had been attained at the Symington plant.

Powdered Coal for Air Furnaces

E. E. Griest, Chicago Railway Equipment Co., Chicago, who read a paper on "Use of Pulverized Coal for Malleable Foundries," said that the use of this kind of fuel was now in the practical stage for melting in air furnaces. His paper was extremely interesting, and was followed by a motion picture showing some remarkable views of the interior of an active furnace. Mr. Griest urged the necessity of a coal, high in volatile matter and low in ash and moisture. Coal, he said, should be crushed before being sent into the pulverizer. Crushing was a cheap operation and there was no clogging of the pulverizer as happened when coal was charged as received. He suggested lump coal as more economical than mine run slack coal and said that frequent analyses should be made because of the inclusion of particles of mine roofs in shipment. Low grade anthracite coal was not as low in sulphur nor as economical as bituminous coal. Selection of coal of low moisture content obviated the need of driers, while the evaporation takes the heat needed for the iron. The finer the coal is pulverized, he urged, the better, because of the greater exposed area. He cited cases of two 20-ton air melting furnaces running on pulverized coal, which were charged at 5 a. m., were ready to pour at 10.20, with pouring completed at 11.15 and the furnaces again charged at noon. The second heats were ready at 4.20 p. m. and pouring completed at 5.15, the elapsed heating time being 9 hr. and 40 min. Even better time was noted on a 25-ton furnace and a 10-ton melting unit. He reported the refractory cost about the same as in hand-fired furnaces and that the oxidation and scrap losses were reduced.

"The Influence of Temperature and Composition on the Graphitization of White Cast Iron," a joint compilation of Prof. A. E. White and Prof. H. E. Gladhill, both of the University of Michigan, was read by the former. The final paper was by E. J. C. Fisher, Atlas Die Casting Co., Worcester, Mass., the subject of which was "The Relation of Temperature to the Form and Character of Graphite Particles in the Graphitization of White Cast Iron."

The Exhibition and Some of Its Features

WHILE the Foundry Exhibition was not the most notable display in the history of the foundry industry nor as large as the one held at Columbus in October, 1920, it was generally regarded as more representative. The displays were located in two adjoining buildings as contrasted to the segregation of various lines of equipment in seven different buildings at Columbus. The attendance was satisfactory and a fair record of sales was reported. The compactness of the exhibit as a whole and the impression of unity were favorable features. The various exhibits were placed in the exhibition buildings at Exposition Park, not far from the buildings in which the technical sessions were held.

There were 173 exhibitors who occupied about 50,000 sq. ft. of floor space as compared with 240 exhibitors occupying 75,000 sq. ft. of floor space at Columbus in October, 1920. These figures contrast with 208 exhibitors occupying 60,000 sq. ft., at Philadelphia in 1919, and with the following data for some previous conventions: With 148 exhibitors occupying 37,000 sq. ft. at Cleveland, in 1916; with 174 exhibitors taking 44,000 sq. ft. at Boston, in 1917, and with 194 exhibitors taking 42,000 sq. ft. at Milwaukee, in 1918.

It has not been possible, in this review, to describe or even mention all the important products and machines which were either entirely new or which have been brought out since the last convention, but only a general account of the exhibition is possible.

Molding Machinery

A large number of molding machines were shown, many of which had not been exhibited before. In common with most of the equipment displayed in the ex-

hibition, the machines were shown in actual operation.

An attractive display was that of the Osborn Mfg. Co., Cleveland, which included a roll-over jolt machine with electrically operated roll-over and pattern draw,

a jolt squeezer machine and other types. A flask filling machine, lately brought out, for handling sand was also a center of interest.

A combination electric-jolt hand strip machine and rock-over drop and square-stand machines were exhibited by Henry E. Pridmore, Inc., Chicago. The Tabor Mfg. Co., Philadelphia, displayed a complete line, including squeezer, jar squeezers, jar strippers and others. A new automatic control for molding machines was noted, but is understood not to be ready as yet for the market. Combination power turn-over machines, combination jolt strippers and hand turn-over machines for castings and cores were exhibited by the International Molding Machine Co., Chicago.

In the exhibit of the Grimes Molding Machine Co., Detroit, a 2500-lb. capacity jar-rammed roll over pattern drawing machine was shown and also a hand-rammed roll over machine. Eleven machines were exhibited by the Wm. H. Nichols Co., Inc., Brooklyn, N. Y., among which were a new portable duplex jolt, squeezer type machine.

A comprehensive and attractive exhibit was that of the American Foundry Equipment Co., New York. Three sand-cutting machines were shown, two of which were in operation as were the several molding machines shown. Other equipment comprised a variety of sand blast apparatus, tumbling barrels and steel flasks. The Federal Malleable Co., West Allis, Wis., among other machines showed the new rapid squeeze stripper molding machine, on exhibition for the first time. A small working model of a large type independent roll-over and pattern-drawing machine was exhibited by the Herman Pneumatic Machine Co., Pittsburgh. The tractor and turn-table sand slingers for high production molding shown in actual operation by the Beardsley Piper Co., Chicago, was a center of interest.

Several molding and core machines, some of them new, were shown by E. J. Woodison Co., Detroit, as well as a variety of foundry supplies. A patented hand squeezer molding machine in three types was exhibited by the Moline Iron Works.

The Arcade Mfg. Co., Freeport, Ill., displayed three types of moderns mounted with plate, air and jolt squeezers, piston-ring squeezers and other types, also Brillon pouring devices. A new jolt stripper was shown.

A jolt roll over, pattern-draw machine and a jolt stripping machine were exhibited by the Davenport Machine & Foundry Co., Davenport, Iowa.

Sand Mixers and Riddles

A new sand separator and blender of the Royer Foundry & Machine Co., Wilkes-Barre, Pa., proved of interest to many. A core sand mixer equipped with power-discharge screen and motor was exhibited by the Blystone Mfg. Co., Cambridge Springs, Pa., and three Simpson sand mixers of the National Engineering Co., Chicago, were shown in operation. Motion pictures showing various sizes of the Wadsworth sand cutter in operation, and also the construction details, were given by H. L. Wadsworth, Cleveland. Several types of vibrating riddles were exhibited.

Sand Blast Outfits

In sand-blast equipment and tumbling barrels several units were displayed. Among new outfits was a small suction sand blast with a cloth screen dust arrester, forming a complete unit which was shown by the Pangborn Corporation, Hagerstown, Md. This company also exhibited a new portable sand blast machine.

The Cyclone suction sand blast was exhibited by W. F. Stodder, Syracuse, N. Y., and sand blast equipment, tumbling mills and other equipment were displayed by the W. W. Sly Mfg. Co., Cleveland. A large exhibit consisted of the automatic dustless rotary table sand blast, revolving barrel sand blast machine and other equipment of the Hoevel Mfg. Corporation, Jersey City, N. J. The Northern Blower Co., Cleveland, showed a steel case dust collector, sand blast room and other equipment, all in miniature size. A new air grinder and a new hand and air squeezer were also

shown. The Macleod Co., Cincinnati, was also an exhibitor of sand blast and tumbling equipment.

Machine Tools

The machine tools exhibited were not as numerous or as varied as at the previous convention. A large display was that of the Syracuse Supply Co., Syracuse, N. Y., consisting of American radial drills, shapers and lathes; Milwaukee milling machines and other tools, all of which were in operation.

Among the grinding machinery exhibits were the flexible shaft motor-driven units of the N. A. Strand Co., Chicago, and the electric hand snagging grinders, tool and other grinders, some of which were new designs, of Forbes & Myers, Worcester. Two new motor-driven grinders were shown by the American Woodworking Machinery Co., Rochester. Improved air and electric portable grinders were shown by the Chicago Pneumatic Tool Co., New York. The Cleveland Pneumatic Tool Co., Cleveland, and the Independent Pneumatic Tool Co. exhibited portable grinders, air drills, and other pneumatic equipment.

A large number of saw machines were exhibited. Band and circular saw-filing and setting machines were displayed by the Black Diamond Saw & Machine Works, Natick, Mass. A saw sharpening machine, together with other tools of the Cochrane-Bly Co., Rochester, was in operation. The Marvel hack-saw machine of the Armstrong Blum Mfg. Co., Chicago, was shown with an exhibit of its automatic saws, rod cutters, punch and shear and bender. The Racine Tool & Machine Co., Racine, Wis., exhibited high-speed metal cutting machines, an automatic broach slotter and key seater and a high-speed portable rail-cutter.

The Henry Disston & Sons, Inc., Philadelphia, and the Simonds Co., of Fitchburg, Mass., had a full display of saw blades.

A working model of the Champion power hammer, motor-driven type, of Beaudry & Co., Inc., Boston, was on exhibition, and a model of a pneumatic or steam power operated rod straightener and shear machine of C. E. McArthur, Chicago, also. Demonstrations of heading large rivets cold by its high-speed riveting hammers was given by the High Speed Hammer Co., Inc., Rochester, and the company's motor driven sensitive bench drill press was shown in operation.

In woodworking machinery the Oliver Machinery Co., Grand Rapids, Mich., had several machines which were brought out since the last convention. Among these was a 15-in. motor-driven disk sander, an oil stone tool grinder, a 6-in. portable hand planer and jointer and a variety portable saw bench. Machinery for pattern shops was displayed by the American Woodworking Machinery Co., Rochester. A new 16-in. band saw was exhibited by J. D. Wallace & Co., Chicago, together with other machines.

Welding Equipment

The new portable semi-automatic arc welding equipment of the General Electric Co., Schenectady, N. Y., was in operation and the Gibb Instrument Co., Detroit, exhibited for the first time a new alternating-current arc welding machine for the reclamation of defective castings. A 175 amp. portable arc welding set with operator making typical welds was shown by the Westinghouse Electric & Mfg. Co., Pittsburgh.

Oxy-acetylene welding and cutting apparatus and accessory equipment was displayed by several companies.

Material-Handling Equipment

Cranes, hoists and other material-handling equipment were for the most part shown in actual operation. The exhibitors were not numerous, but they represented a varied line.

An interesting exhibit was that of the Cleveland Crane & Engineering Co., Wickliffe, Ohio, which included a tramrail crane and other units, all in operation. Several sizes of the Shepard electric lift-about were exhibited in operation by the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y. Overway conveying equipment in both trolley and I-beam types was shown by the Richards-Wilcox Mfg. Co., Aurora,

III. A new trolley, known as the Whale, was a feature of interest and was displayed carrying a 1044 lb. weight up on an I-beam, a 5 lb. weight being used to start it moving on the I-beam.

The P. H. & F. M. Roots Co., Connersville, Ind., in addition to its exhibit of blowers and other equipment showed a cupola charging hoist recently brought out. Industrial trucks and tractors, both gasoline and electric, were exhibited by several manufacturers. Photographs of installations of sand handling and preparing equipment were shown by the Link Belt Co., Philadelphia, also the Rapp revivifier for molding sand.

In air hoists the Hanna Engineering Works, Chicago, exhibited a cross section of its pneumatic cylinder hoist, showing the piston and piston-rod features. The Hayward Co., New York, had a new air-operated orange-peel bucket, other buckets being shown also, all of which were in operation on piles of sand.

Furnaces, Ovens and Heaters

In metal melting furnaces an attractive exhibit was that of the Electric Furnace Co., Salem, Ohio, with a small furnace in operation. The General Electric Co., Schenectady, displayed a crucible melting furnace with automatic control panel and transformer. Furnaces for ferrous and non-ferrous metals were shown by the Monarch Engineering & Mfg. Co., Baltimore. The Ajax-Wyatt and Ajax-Northrup furnaces were exhibited by the Ajax Metal Co., Philadelphia. The Wayne Tank & Pump Co., Fort Wayne, Ind., exhibited a melting furnace, ladle heater, etc. A working model of a mechanical blast heater was exhibited by Robt. Gordon, Inc., Chicago, and heating equipment by the Skinner Brothers Mfg. Co., St. Louis. The first exhibition of its new sectional type core oven was made by the Ohio Body & Blower Co., Cleveland. The Young Bros. Co., Detroit, exhibited an insulated steel-panel oven.

Air Machinery

The exhibits of compressors were impressive. The Sullivan Machinery Co., Chicago, made an interesting showing of its angle compound compressor, which operated to supply exhibitors with air power, and other types were also shown. A Westinghouse-National operative automatic compressor in operation was shown by the Westinghouse Traction Brake Co., Pittsburgh.

In addition to other equipment the exhibit of the Ingersoll-Rand Co., New York, included a new type compressor equipped with Imperial plate valves. Compressors were shown by the Chicago Pneumatic Tool Co., New York, with hoists and other air equipment. Turbo machines of the Spencer Turbine Co., Hartford, for cupolas and for oil and gas burning brass melting furnaces, were shown.

Other Equipment

A variety of other equipment was exhibited, such as testing and scientific instruments and counting and weighing machines. Several engineering companies displayed photographs and plans of foundries, machine shops and forge plants. In building material Fenestra window walls were shown by the E. F. Hauserman Co., Cleveland, and a variety of material including steel sash was exhibited by the Truscon Steel Co., Youngstown, Ohio. Pivoted and other types of sash were displayed by David Lupton's Sons Co., Philadelphia, a model of a Pond Truss foundry being a feature of this company's exhibit. Photographs of powdered coal equipment for air melting furnaces, annealing ovens and other uses were shown by two exhibitors.

The Banquet

An unusually successful banquet was held Wednesday evening, June 7. Because of the severe illness of the association's president, W. R. Bean, Eastern Malleable Iron Co., Naugatuck, Conn., the post-prandial feature of the convention was presided over by C. R. Messinger, president Sivyer Steel Casting Co., Milwaukee. Mr. Messinger later introduced as toastmaster for the evening Roland B. Woodward, secretary Rochester Chamber of Commerce, who made a pronounced hit. After a well-chosen speech by F. J. Cook,

delegate of the Institution of British Foundrymen to this convention, the toastmaster introduced as the leading speaker of the evening Hon. H. J. Allen, Governor of Kansas. In an inspiring and stirring address Governor Allen presented the details of his experience with organized labor in Kansas and the formation and results of the Kansas Court of Industrial Relations, which was brought into being two years ago to protect the public from the cessation of industrial operations either through lockouts of employers or strikes of employees.

New Officers and Business Matters

The regular business meeting followed the session on malleable iron Friday morning. The announcement of the tellers of the result of the election of officers and directors showed that the following had been chosen for the ensuing year:



C. R. MESSINGER



G. H. CLAMER

President—C. R. Messinger, Sivyer Steel Casting Co., Milwaukee.

Vice-President—G. H. Clamer, Ajax Metal Co., Philadelphia.

Secretary (re-elected)—C. E. Hoyt, Chicago.

Directors for 3 years—C. E. Connelly, Pennsylvania Industrial Department, Harrisburg, Pa.; Fred Erb, Packard Motor Car Co., Royal Oak, Mich.; C. E. Hoyt, Chicago; L. W. Olson, Ohio Brass Co., Mansfield, Ohio; A. B. Root, Jr., Hunt Spillar Mfg. Co., Boston.

The usual resolutions of appreciation and gratitude to the local Rochester committees, to the chamber of commerce of Rochester, to the foreign visitors and to the work of the various officers and committees was adopted as presented by the committee on resolutions comprising A. E. Howell, chairman; H. E. Diller, H. S. Simpson and E. F. Cone.

W. R. Bean, retiring president, who was prevented by illness from attending the convention, was elected an honorary life member of the association.

A committee composed of R. A. Bull, G. H. Clamer and William B. Greenlea, was appointed to acknowledge and suitably reply to the messages conveyed through F. J. Cook from the several British iron, steel, foundry and metallurgical associations.

C. R. Messinger, new president of the association, spoke briefly, voicing his appreciation of his elevation to the head of the organization. He said the association was purely a technical one and functioning properly should show the way to the weaker, and be an inspiration to the stronger ones.

C. E. Hoyt, secretary, declared the convention the most successful ever held, laying stress upon the international character of the gathering and the interest aroused in the subject of sand research.

Reports of the sessions on "Molding Sand Research," presided over by R. A. Bull; of the session devoted to "Aluminum Topics," presided over by R. J. Anderson, Bureau of Mines, Pittsburgh, and on the session covering "Industrial Relations," presided over by Dean C. B. Connelley, Harrisburg, Pa., will be carried over into the issue of THE IRON AGE of June 22.

Sees No Violation of Law in Mergers

Samuel Untermyer, Counsel for Lockwood Committee, Says
Midvale-Republic-Inland Consolidation Is Not
Illegal, But Criticises Stock Selling

THE examination by the Lockwood committee at City Hall, New York, into the mergers of independent steel companies was resumed last Thursday with particular emphasis being placed on the stock marketing phases of the proposed Midvale-Republic-Inland combination. Samuel Untermyer, counsel for the committee, said that as the legality of the Bethlehem-Lackawanna merger was under consideration by the Federal Trade Commission, no further comment on that subject would be proper at this time. As to the Midvale-Republic-Inland merger he said:

"With respect to this company merger I have no recommendation to make to the committee. If, as has been testified, it would have the effect of reducing the huge differential now enjoyed by the United States Steel Corporation, it might be a public benefit. Any move in the steel business that tends toward destroying the monopoly now enjoyed by the United States Steel Corporation should be welcomed.

"The future only can determine whether this merger will have that effect or whether it will merely assist these larger entities more readily to come together with the United States Steel Corporation in the way of conducting the general business of the country in steel.

It may be that upon a strict construction of the Clayton act the Federal Trade Commission has jurisdiction to halt this merger on the ground of unfair competition. It would be a parody upon justice, in my opinion, for a court to hold that a merger constituting 10 per cent is illegal under the Sherman act, whatever may be the fact under the Clayton law, in view of the decision of the Supreme Court sustaining the United States Steel Corporation, with 50 per cent or more of the ingot capacity of the company and with transportation lines and other facilities that together place it in supreme control of the steel industry in this country as though it had an absolute monopoly.

"Wise Policy" of Steel Corporation

"It has no real competition. Whenever it wants all the business of the country, all it has to do is to go and take it. The other companies are and will remain helpless against it. The fact that it is a benevolent despotism and that the steel company is pursuing a wise policy, one of vision, does not alter the essential legal situation. It is a monopoly, upon the evidence here. Whether it chooses to exercise its monopolistic powers or not, rests with it. Thus far it has wisely decided not to do so.

"But on the other hand, the people get no benefit from any of the economies of the United States Steel Corporation. In the great years of the war when it was making \$300,000,000, and other companies were making fabulous sums, it did nothing to give the public the relief that might come from this differential in its favor. And the same remains true to-day. It still keeps the price of the commodity at a figure that gives it not only that differential, but a wide profit over and above that which is enjoyed by the other companies. So that, so far from its economies helping the public, they simply go into the pockets of the stockholders of the steel company.

"But one cannot but pause in admiration of the magnificent, superb management of that corporation and the splendid statesmanship that has been shown in getting and holding the public by the throat.

"But for the unexpected publicity given these mergers, they would have slid through. There was no public authority that had to be notified that they were about to come together, and in the great variety of mergers that are not so stupendous in their size and that do not therefore challenge public attention they

go through because there is no authority that has to give permission before they can go through.

Stock Exchange and Trusts

"I want to say in connection with this Stock Exchange situation that it lies very close to the subject we are here to investigate, because, in my judgment, if there were no manipulable transactions in securities on the Stock Exchange there would be few or no trusts. If the people could not market these securities in that way, we would probably have fewer combinations.

"We are indebted mainly to the manipulative machinery of stock exchanges for these huge combinations that have the country in their grip. It would have been impossible to put them together but for the facilities thus offered to market the stock, and it would have been impossible to market those huge blocks of stock but for the pools and syndicates and other devious methods that have heretofore been employed, some of which are, happily, dim memories of the past.

"Regulate the stock exchanges as to pool transactions in securities; require pitiless publicity as to them, and you have taken an important step in curtailing the organization of trusts by destroying the stock gambling incentive to which so many owe their origin.

"Persistent agitation and fear of Government regulation have happily forced some reforms in the unspeakable practices of 'wash sales' and 'matched orders' that were formerly the order of the day, and were regarded as a legitimate and respectable part of the game. But the situation is still far from being safe for the public, and it will never be made so until these exchanges are subjected to regulations that will convert them from gambling houses into the great, legitimate, security markets of the world that they should be and will be when these reforms have been effected."

Testimony as to Stock Rules

Mr. Untermyer's examination of witnesses on Thursday and Friday dealt largely with stock manipulation. He made a statement that the committee, in addition to gathering facts as to the possibility of the steel company mergers affecting the price of steel for building construction in New York, was also interested in information on which to base recommendations to the State Legislature for legislation controlling the buying and selling of stock on the exchanges.

He called Mortimer L. Schiff of the banking firm of Kuhn, Loeb & Co. to the stand again at the opening of the Thursday session and examined him at length as to the arrangements which Kuhn, Loeb & Co. have made regarding flotation of the stock of the proposed North American Steel Co., the tentative name adopted for the Midvale-Republic-Inland merger. Mr. Schiff stated that the plans of his firm for handling the stock of the new steel company were "intentions" only and that his firm was under no obligation, "moral or otherwise," to become the bankers for the consolidated company.

Mr. Chadbourne Purged of Contempt

The controversy between Mr. Untermyer and Thomas L. Chadbourne, negotiator of the merger, on the preceding Saturday, when the witness declined to produce all of the papers that Mr. Untermyer wanted, came to light again in the second examination of Mr. Chadbourne, who had brought most of the papers Mr. Untermyer asked for, but who declined to produce figures relating to the four steel companies which have withdrawn from the merger, these being the Steel & Tube Co. of America, the Youngstown Sheet & Tube Co., the Brier Hill Steel Co. and the Lackawanna Steel Co.

As a result of this refusal Mr. Chadbourne was declared by the chairman of the committee to be in contempt, but he later purged himself of this charge by permitting Mr. Untermeyer to have a private view of the figures. Mr. Untermeyer had stated that he would make no publicity of these figures, but that the committee was entitled to see the complete report of the accountants as to all of the seven companies because of the possibility that some of these companies might later be drawn into this or some other merger.

At the Friday hearing Mr. Untermeyer examined curb market brokers as to the recent buying and selling on the curb market of North American Steel on a "when issued" basis. As a result of facts brought out in this examination, Mr. Untermeyer on Sunday sent a letter to the New York Curb Market Association, demanding that trading in the stock of the North American Steel Co. on a "when issued" basis shall cease until the full terms of the Midvale-Republic-Inland merger have been announced to the public. Mr. Untermeyer, in this letter, stressed the testimony of Mr. Schiff of Kuhn, Loeb & Co., who said on the stand that his firm recognized no obligation, moral or otherwise, in connection with the undertaking, despite the fact that its name has been advertised as banker for the plan. Mr. Schiff had also testified that he had no knowledge of how his firm proposed to market the 505,000 shares of new stock which the syndicate will take over, but on Friday, Mortimer Altmayer, a curb broker, testified that he had orders

from Kuhn, Loeb & Co. to buy 10,000 shares of the new stock at \$50 a share soon after trading began.

Mr. Untermeyer's letter to the Curb Market Association was in part as follows:

"Unless the gambling operations now being conducted on your exchange in the non-existent stock of the North American Steel Co. 'when issued' cease instantly by the withdrawal of the privilege of trading, the facts will be forthwith placed before the Grand Jury that is now in session for the purpose of dealing with cases arising out of the investigation of the Lockwood committee and an indictment will be asked for of all concerned."

The New York Curb Exchange refused Monday to stop trading in North American Steel Co. stock on a "when issued" basis, as demanded by Mr. Untermeyer, and it is understood that the facts in the case will be presented to the grand jury as Mr. Untermeyer had threatened. The board of governors of the New York Curb Market held a special meeting to consider the statement of Mr. Untermeyer and afterwards notified him that all contracts in North American Steel Co. "when, as and if issued" will be settled in the exchange, on the basis of the formal plan previously issued to the stockholders. The plan dealt with the capitalization, distribution of securities, fixed charges and earnings and other details.

Dealing in the stock of the new merger continued Monday, opening at 47% and closing at 46%.

Bethlehem and Lackawanna Companies File Answers

WASHINGTON, June 13.—Denial of the jurisdiction of the Federal Trade Commission in its complaint against them in connection with their pending merger is made in answers filed with the commission last Thursday by the Bethlehem Steel Corporation and the Lackawanna Steel Co. They also declare that they are not in competition with each other within the meaning of the word "competition" as it is used in the laws of the United States. The carrying out of the merger plans, it is stated, will not violate the provisions of Section 5 of the Federal Trade Commission act, under which the complaint was issued, or any provision of any law. Request was made that the complaint be dismissed.

It is asserted in the answers that the complaint fails to state facts sufficient to constitute a violation of law and that the transaction alleged in the complaint is not an unfair method of competition or a method of competition of any kind. Without waiving defects in the jurisdiction of the commission, the answers say, and reserving the benefit of all exceptions that can or may be taken and denying that the proceeding is in the public interest, the charges are replied to specifically, many of which are only a reiteration of physical facts set forth in the complaint. The answers correct certain statements in the complaint as to their operations and takes distinct exceptions to others. In this connection, the answers deny knowledge sufficient to form a belief as to whether the amount of steel rails produced by Bethlehem is approximately 10 per cent of all rails manufactured in Ohio and north of the Potomac River, or whether the amount of long angle splice bars and other rail accessories manufactured by Bethlehem amounts to 22 per cent of all of the commodities manufactured in the territory mentioned. It is admitted that the Lackawanna Steel Co. manufactured and sold in 1920 approximately 15.18 per cent of all the steel rails and approximately 10.74 per cent of the long angle splice bars and other rail accessories in the United States that year, but it is stated that approximately 14 per cent of the former and approximately 11 per cent of the latter were exported through the Consolidated Steel Corporation. It is added that a large tonnage of rail accessories made in that year was of a kind not made by Lackawanna and that a large part of those made by Lackawanna was not made by Bethlehem. The replies deny all allegations in paragraph 32 of the complaint as to the proportion of output of given tonnages of the two com-

panies, except that it is admitted that the two companies together produced the amount of rails and accessories in 1920 which the complaint stipulated, being approximately 22 per cent of the rail output and approximately 26 per cent of the production of rail accessories. Bethlehem, it is stated, exported through the Consolidated Steel Corporation in that year approximately 13 per cent of the rail production and approximately 7 per cent of the rail accessories manufactured in 1920.

Benefits Expected to Be Realized

The Bethlehem answer in paragraph 16 sets forth the reason for the agreement of May 16 for the acquisition of the properties and assets of the Lackawanna Steel Co., as follows:

(a) This respondent desires to add to the line of products manufactured and sold either by it or by said Bethlehem Steel Co., and the acquisition of the properties of respondent Lackawanna Steel Co. will enable this respondent to manufacture and sell certain products which it and its subsidiaries do not now manufacture and sell and will thereby add to the number of steel products that this respondent and its subsidiary companies can manufacture and offer for sale and sell in interstate trade and commerce, in competition with its rivals in the steel industry.

(b) There are certain markets which said Bethlehem Steel Co. cannot reach because of the disadvantage in freight rates under which it sells its products, and the acquisition by this respondent of the plant of respondent Lackawanna Steel Co., with a large capacity for the production of steel rails and rail accessories and other products in a territory in which said Bethlehem Steel Co. cannot now sell, will enable this respondent to compete in such territory for the business of railroad companies and other consumers therein.

(c) The acquisition by this respondent of a plant located on the Great Lakes will enable it to reach and compete in the great markets of the Middle West and Canada, in which said Bethlehem Steel Co. heretofore has been unable to meet in competition its rivals for trade.

(d) This respondent will acquire valuable ore deposits in the lake regions, which will enable it to obtain a supply of ore for the plants of said Bethlehem Steel Co. that will be uninterrupted in the event that any conditions shall arise which will interfere with ocean transportation of ores from the mines owned or leased by certain of the subsidiaries of this respondent in Cuba and Chile. This respondent deems this reason very important in view of the experience of said Bethlehem Steel Co. during the recent world war.

(e) The carrying out of said agreement of May 16, 1922,

will constitute another step in rounding out the operations of this respondent and its subsidiaries as an integrated iron and steel enterprise, and is undertaken pursuant to its policy to widen the legitimate field of its and their operations; and the acquisition by this respondent of the properties of the respondent Lackawanna Steel Co. will inure to the benefit of the consumers in this country of iron and steel products; and the operation of the plants owned by the respondents and their subsidiaries (not including, however, the corporation only a part of the stock of which is owned by respondent Lackawanna Steel Co.) under one management which will enable this respondent directly and through said Bethlehem Steel Co. to compete with the vastly larger steel interests and to extend the sale of its products in the markets of the world.

The Bethlehem answer is signed by R. E. Math, secretary of the corporation, and by Carl A. de Gersdorff and Hoyt A. Moore of the law firm of Cravath, Henderson, Leffingwell & de Gersdorff. The Lackawanna answer is signed by President G. F. Downs and

William Lloyd Kitchel of the law firm of Cadwalader, Wickersham & Taft.

Consideration is being given by the commission to the request of the two companies that the date of hearing, which has been set for July 24, be advanced.

Attorney de Gersdorff called at the Department of Justice and reported to Attorney General Daugherty that the companies were ready to report to the department in detail regarding the proposed merger and requested that the investigation be expedited so as to prevent delay which would seriously handicap the plans of the company. The department issued a statement after the visit of Mr. de Gersdorff, saying that investigation "in New York and Buffalo will continue and as soon as possible after the necessary additional information has been furnished a final hearing will be held, if necessary, and a report made to the Senate in response to the resolution."

Production of Iron and Steel Products in 1921

In THE IRON AGE of June 8, the principal statistics, compiled by the American Iron and Steel Institute, showing production of steel ingots and castings and rolled products in 1921, were published. Additional details are given in the following tables, indicating that in all products there was a sharp decline in production for 1921 as compared with 1920:

PRODUCTION OF DUPLEX STEEL INGOTS AND CASTINGS, GROSS TONS, 1912-1921.

Years.	Gross tons.	Years.	Gross tons.	Years.	Gross tons.
1912.....	1,438,654	1916....	3,436,457	1920....	3,279,119
1913.....	2,210,718	1917....	3,791,830	1921....	840,251
1914.....	835,690	1918....	3,870,017		
1915.....	1,781,491	1919....	2,819,785		

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS

Years.	Ingots.	Castings.	Total.	Years.	Ingots.	Castings.	Total.
1909....	158,978	23,002	181,980	1916....	1,306,157	56,458	1,362,615
1910....	538,462	29,357	567,819	1917....	1,576,806	67,529	1,644,335
1911....	425,169	56,290	481,459	1918....	1,721,367	66,485	1,787,852
1912....	680,392	103,109	792,501	1919....	1,435,816	45,372	1,481,188
1913....	625,430	88,927	714,357	1920....	1,591,939	68,353	1,660,292
1914....	577,107	69,846	646,953	1921....	769,293	40,255	809,548
1915....	923,251	97,806	1,021,147				

PRODUCTION OF CONCRETE BARS, SHOWING IRON AND STEEL CONCRETE BARS SEPARATELY, GROSS TONS, 1909-1921.

Years.	Iron.	Steel.	Total.	Years.	Iron.	Steel.	Total.
1909....		159,352	159,352	1916....	2,683	458,717	461,400
1910....	4,645	236,464	241,109	1917....	1,497	469,687	471,184
1911....	2,388	256,353	258,741	1918....	468	344,152	344,620
1912....	2,500	271,832	274,332	1919....	2,295	416,726	419,021
1913....	113	319,557	319,670	1920....	698	571,747	572,445
1914....		288,471	288,471	1921....	1,094	226,134	227,228
1915....		353,408	353,408				

PRODUCTION OF MISCELLANEOUS ROLLED PRODUCTS, GROSS TONS, 1917-1921.

Products.	1917.	1918.	1919.	1920.	1921.
Hoops.....	347,186	262,281	233,336	333,440	166,961
Bands and cotton-ties.....	490,893	250,767	352,172	388,862	143,425
Long angle splice bars, fish-plate bars, tie-plate bars, etc.....	606,824	416,905	434,008	575,830	423,820
Rolled sheet piling.....	18,606	11,689	17,811	20,716	18,165
Railroad ties.....	9,103	6,438	16,645	26,310	10,361
Rolled forging blooms, forging billets, etc.....	1,801,706	1,659,118	359,582	447,334	108,456
Blooms, billets, sheet bars, tinplate bars, etc., for export.....	1,158,427	832,746	92,143	136,457	7,506
Spike and chain rods, bolt and nut rods, horseshoe bars, strips, shafting, tires, etc.....	1,797,802	1,793,734	1,487,423	2,089,912	880,836
Total.....	6,230,549	5,233,678	2,993,120	4,018,861	1,759,530

PRODUCTION OF IRON AND STEEL PLATES AND SHEETS, 1892-1921.

Years.	Gross tons.	Years.	Gross tons.	Years.	Gross tons.
1892.....	751,460	1902.....	2,665,409	1912.....	5,875,080
1893.....	674,345	1903.....	2,599,665	1913.....	5,751,037
1894.....	682,900	1904.....	2,421,398	1914.....	4,719,246
1895.....	991,459	1905.....	3,532,230	1915.....	6,077,994
1896.....	965,776	1906.....	4,182,156	1916.....	7,453,980
1897.....	1,207,286	1907.....	4,248,832	1917.....	8,267,616
1898.....	1,448,301	1908.....	2,649,693	1918.....	8,799,135
1899.....	1,903,505	1909.....	4,234,346	1919.....	7,372,814
1900.....	1,794,528	1910.....	4,955,484	1920.....	9,337,680
1901.....	2,254,425	1911.....	4,488,049	1921.....	4,260,574

PRODUCTION OF PLATES AND SHEETS BY KINDS, 1920-1921.

Kinds.	1920—Gross tons.			1921—Gross tons.		
	Iron.	Steel.	Total.	Iron.	Steel.	Total.
Universal plates*.....	3,640	1,246,129	1,249,769	1,498	569,112	570,610
Sheared plates—						
Rolled on single stands.....	920	2,842,916	2,843,836	89	985,273	985,362
Roughed and finished on separate stands.....		661,528	661,528		204,352	204,352
Black sheets rolled on sheet or jobbing mills.....	27,790	2,858,611	2,886,401	18,650	1,493,167	1,511,817
Black plates, including black plates for tinning and black plate specialties rolled on tin mills.....	1,761	1,694,385	1,696,146		988,433	988,433
Total.....	34,111	9,303,569	9,337,680	20,237	4,240,337	4,260,574

* Include flats and bars over 6 inches wide.

PRODUCTION OF FINISHED ROLLED IRON AND STEEL BY LEADING PRODUCTS, GROSS TONS, 1921.

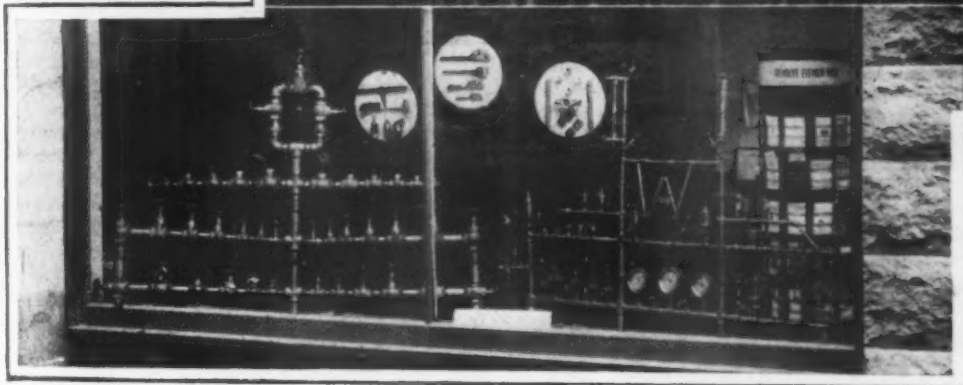
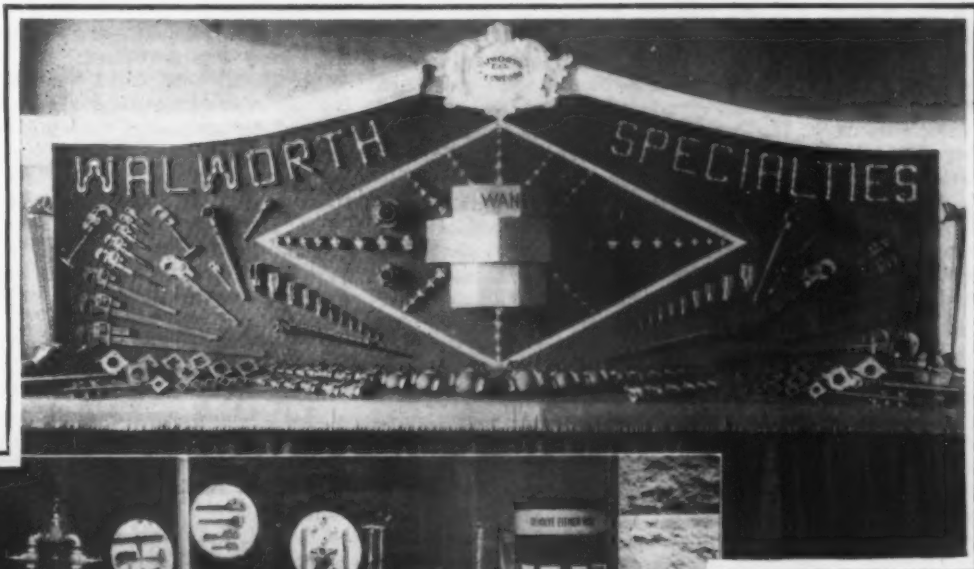
Products.	Iron.	Steel.	Total.
Rails.....		2,178,818	2,178,818
Plates and sheets.....	20,237	4,240,337	4,260,574
Nail and spike plate.....	103	14,470	14,573
Wire rods.....	525	1,563,805	1,564,330
Structural shapes.....	87	1,272,537	1,272,624
Merchant bars.....	198,324	1,367,430	1,565,754
Bars for reinforced concrete work.....	1,094	226,134	227,228
Skelp, flue, and pipe iron or steel.....	115,523	1,815,052	1,930,575
Hoops.....		166,961	166,961
Bands and cotton-ties.....	618	142,807	143,425
Long angle splice bars, tie-plate bars, etc.....	45,822	377,998	423,820
Rolled sheet piling, not including fabricated.....		18,165	18,165
Railroad ties.....		10,361	10,361
Rolled forging blooms, forging billets, etc.....	250	108,206	108,456
Blooms, billets, sheet bars, etc., for export.....		7,506	7,506
All other finished rolled products.....	163,094	717,742	880,836
Total.....	Gross tons.	545,677	14,228,329

UTILIZING WINDOW SPACE

How Attention to Displays of Mill Supplies Brought Results—Prize Contests Among Employees

Branch houses of steel products manufacturers usually are located in sections of cities commonly considered as little frequented by consumers. More often than not these branch houses are provided with windows. The windows bear the name of the occupant and possibly contain a display of the company's product, very often not varied within periods of six months or longer. Comparatively little intrinsic value is attached to the windows as an advertising medium. The Walworth Mfg. Co., Boston, maker of wrenches, pipe fittings, etc., has made a systematic investigation to deter-

Instead of Neglecting Them or Giving Them Indifferent Attention, Warehouse Windows Were Made the Basis of Competition Among Employee Committees for Business Attracting Displays. Changes were made periodically and photographs of them were exchanged among the branches of the house, both for the suggestion value and as the



means of arriving at awards of prizes. The illustrations are random selections, the upper one from the Oregon branch of the Walworth company and the other from the Boston branch

mine the value of such windows, if any, and results obtained are interesting.

The company maintains six branch houses, one each in Boston, New York, Philadelphia, Chicago, Seattle and Portland, Ore. Its investigations have taken the form of a contest among the branch houses themselves, involving cash prizes for the best window displays. Two such contests have been held, the first from May to October, 1920, inclusive, and the second from December, 1920, to May, 1921, inclusive. In other words, twelve full months have been devoted to intensive study of this question.

Both contests were conducted along similar lines, there not being enough deviation to warrant comment. The rules were few and simple. First, each branch house manager appointed six committees and a chairman for each. The branch house manager and his assistant were not qualified for these committees, which included all other classes of labor employed and were unlimited in number. Each committee was given charge of a window display in its particular branch for one calendar month, and each committee was allowed to arrange any type of window display desired, subject, however, to instructions of the branch manager. The maximum expenditure chargeable to the company in connection with each display was \$10.

Jurisdiction over window displays was vested in branch house managers because it was felt that certain

goods might be regarded as particularly seasonable in a special locality at a particular time, and they might feel that certain goods should be displayed. Providing a branch house manager varied the plans of any particular committee, it was the duty of the latter to make the best display possible with the type of goods selected by him. The rules also stipulated that six 8 x 10-in. photographs of each window display be sent to the company's general office. Each branch was furnished with photographs of the displays made by the others.

The company offered a cash prize to the committee making the best display at each branch house and another for the best of all displays. The individual branch house contest was decided by the combined six committees. The grand prize was awarded by a committee composed of general office officials. In making its decision, the latter gave due consideration to conditions existing at the different branch houses. For instance,

one branch house might have a very much better window in which to display goods than another. In the case of the Oregon branch, there are no windows, consequently the committees were obliged to resort to inside displays. The guiding factor in the decision was, which committee utilized the possibilities of its particular window to the best advantage.

The general intent of the plan was to enlist the best thought in each branch house for the purpose of making the window in that branch an active force for sales promotion and education as regards Walworth products. The principal object was to attract the attention of the passing public. The photographs shown were selected at random from negatives furnished by the six committees of each branch house, and illustrate better than anything else the thought and time given to displays.

It was found that changing windows each month not only attracted wide attention, but increased sales resulted from this fact alone, as was determined by statements made by customers. The most significant result obtained from the investigation, however, was the greater familiarity with the company's product obtained from closer contact between practically everybody employed at the branch house—from the office boy up. New angles for presenting the company's product to the consumer were developed and sales resulted. Now that the contest is over, window displays are changed more often than was the case prior to 1920.

SHEET STEEL SELLING

Problems of Distribution Considered by Metal Branch of National Hardware Association

Various problems affecting the distribution of sheet steel, tin plate and other products handled by sheet metal and hardware jobbers were discussed at the eleventh annual meeting of the Metal Branch of the National Hardware Association held at the Statler Hotel, Cleveland, June 9 and 10. This was attended by about 100 members, including sheet steel manufacturers and distributors. Business conditions were touched on by a number of speakers, who told of the improvement in trade and predicted good business for some time to come.

The topic that seemed to arouse the most interest from a distributor's standpoint and caused complaint on the part of jobbers, was the practice of sheet mills in taking less than car load lot orders from jobbers' customers at the same price charged jobbers for car lots. Efforts will be made to have mills change their practice in this respect.

Chairman W. H. Donlevy, Philadelphia, in his opening remarks stated that 90 per cent of replies to letters that he had sent out one month ago to sheet mill jobbers indicated that the one thing which was giving them more concern than any other was the fact that they were doing business at a loss. He said that this was evidently caused by a wave of price competition and this was one thing that the meeting should consider.

Business Tide Turns

The meeting was addressed briefly by A. H. Decatur, Boston, president of the National Hardware Association. He spoke of the unsatisfactory business conditions during the past year, but declared that the tide has turned. At a meeting of the executive committee of the National Hardware Association June 8, he said all members representing all sections of the country reported that there had been a wonderful change for the better in business during the past 60 days. Mr. Decatur urged manufacturers to be conservative and not dump goods on the market at a loss. They should devote their energies to moving these lines for which there is a demand. He predicted a long period of active business and a five year period of decline in manufacturing costs and prices. Mr. Decatur urged manufacturers to depend more on jobbers for the distribution of their goods.

William E. Manning, Youngstown Sheet & Tube Co., discussed "The Marketing of Steel Products on a Basis that Would Allow a Reasonable Profit to Jobbers and Manufacturers." He said that in 1921 manufacturers tried to do a large volume of business regardless of cost of manufacture. Jobbers sold at prices too low to cover the cost of conducting their business. A jobber should not do business at a loss to keep his trade because a competitor is doing it. Both manufacturers and jobbers should put their price on a basis that will give them a profit.

The condition of the sheet steel market was discussed briefly by a number of mill representatives who complained of a labor shortage and said costs are increasing.

Cost of Sheet Making

Someone asked if the reduction in freight rates July 1 will bring down sheet prices. Mr. Mercer replied that figures show that the production costs of sheets will be \$12.25 per ton higher on July 1 than on Jan. 1 last, or more than three times the amount of the saving in the freight rate reduction.

"The Cost of Making Small Mill Shipments Direct to Jobbers' Consumers" was discussed by M. C. Summers, Superior Sheet Steel Co., Canton, Ohio. According to his figures it costs \$2.25 per ton to ship less than car load lots.

W. D. Taylor, president Geo. Worthington Co., hardware jobbers, Cleveland, asked why mills sell less than car load lots to jobbers' customers at the same price as they sell car loads to jobbers in view of the fact it costs the mill over \$2 per ton extra to make

these shipments. He did not object to mills going after this retail trade if they would put up their prices on the small orders.

Mr. Manning said that a solution of the problem would be the making of a charge of a quantity differential of 25c. for less than car load lots. In his opinion this charge would put practically 100 per cent of this business into the hands of the jobber.

This matter was referred to a committee of which W. E. Manning was chairman. Later the committee reported that the jobbers complaint will be laid before the Sheet Metal Manufacturers' Association.

A. W. Howe, G. M. & L. A. Osborn Co., Cleveland, discussed the proper distribution of sheet metal products and suggested an appointment of a committee on a code of ethics of bringing mills and jobbers together to work out problems of distribution.

F. O. Schoedinger, Columbus, Ohio, reported for the Committee of National Advertising that mills showed a disinclination to embark on a national advertising campaign to stimulate the demand for sheet steel. The committee was continued.

A. H. Nichols, Buhl Sons Co., Detroit, in discussing the cost of handling sheets and tin plate from the warehouse, advocated the co-operation between jobbers and manufacturers with the view of cutting down lines and sizes, saying that this would result in a greater turnover for the jobber and would help the maker.

S. H. Wolff, Illinois Zinc Co., speaking on zinc and zinc roofing, said that zinc roofing products are now meeting with considerable favor among architects and builders and that five or six manufacturers are now making zinc shingles.

The effect of the decision of the Supreme Court in the *Winsted Hosiery* case as it applies to products distributed by sheet metal jobbers, was discussed by M. L. Lissberger, representing the Solder and Bearing Manufacturers' Association. He said that the trade designations that for a long time have been applied to solder and Babbitt metal are misleading and must be changed under the court's decision. A solder cannot be described as half and half unless it is half tin and half lead.

Later a committee presented a report expressing the opinion that the sale of any article which is misbranded is in violation of the law and recommended that copies of the Supreme Court's decision be sent to members and all members be advised as to the desirability of protecting themselves by receiving guarantee of indemnification from their sources of supply.

Thomas D'Arcy Brophy, Anaconda Copper Mining Co., told of the publicity campaign conducted during the past year to bring about the greater use of copper. This, he said, had created a demand, but the manufacturer must have the co-operation of sheet metal distributors to make the campaign successful.

National Advertising

National advertising was discussed by L. D. Mercer, United Alloy Steel Corporation. He said that everybody was in favor of advertising provided that the other fellow pays for it. He believed that there had been a change in the sentiment of some mills, so that an active national advertising campaign might be made a success. He declared there are a hundred things that can be made of special grades of sheets which are now made of some other material and that the surface of the field for special sheets has only been slightly scratched.

W. H. Donlevy was re-elected chairman of the branch. The following members of the Metal Committee were elected to serve three years.

Fred L. Greely, The Herrick Co., Boston, Mass.

F. O. Schoedinger, F. O. Schoedinger, Columbus, Ohio.

Clifford E. Pierce, Betz-Pierce Co., Cleveland.

John Follansbee, Follansbee Bros. Co., Pittsburgh.

L. D. Mercer, United Alloy Steel Corp., Canton, Ohio.

G. F. Ahlbrandt, American Rolling Mill Co., Middletown, Ohio.

F. J. McNeive, W. E. Potts Son & Co., Inc., Philadelphia.

Walter C. Carroll, Inland Steel Co., was elected for two years to serve an unexpired term.

BOOK REVIEWS

Electric Ship Propulsion. By Commander S. M. Robinson, U. S. N. Published by Simmons Boardman Publishing Co., New York. Pages 274 + vi, 6 x 9 in., 140 illustrations. Price, \$6.

An attempt has been made to cover as thoroughly as possible the special points that arise in connection with the propulsion of ships by electricity, and to compare this method with others that are already in use or projected. Where use is made of apparatus that has not previously been thoroughly described in existing text books, a full description is given.

The work is divided into seventeen chapters, of which six are devoted exclusively to naval material, while three of the others are about half naval material and half merchant ships. Altogether, practically two-thirds of the volume is covered by matters connected with the use of electric propulsion in the United States Navy. This arises from the fact that the United States Navy has devoted a larger amount of attention to this subject than any other organization, or than any group of other organizations, in the world. It arises further from the fact that the navy has made progressive use of electric apparatus as propelling instruments for ships, going from the collier *Jupiter*, with 7000 hp., to the battleship *New Mexico*, 31,000 hp., and extending further into other battleships and other vessels of still higher power.

A recapitulation shows the type of electric propulsive machinery and other machinery best adapted to each class of ship, as follows: Diesel electric propulsion for low speed cargo vessels of less than 3000 hp. Turbo electric propulsion for cargo and passenger vessels requiring more than 3000 hp., but not enough to require the use of four propellers; also for passenger vessels of high speed and of sufficient power to require four propellers. Geared turbines (without electric drive) for destroyers, scout cruisers and light cruisers. Turbo electric propulsion for battleships and battle cruisers.

Aside from chapters devoted specifically to different types of propulsion in the United States Navy, the work divides up naturally into the history of the subject, various systems used, characteristics of propellers, motors, generators, turbines, etc., as well as four chapters on auxiliary apparatus and procedure. One chapter is devoted to a British merchant ship propelled by electricity.

The use of tables throughout the book is general and the illustrations are given in great detail, particularly in connection with mechanical and electric wiring features.

Milling Cutters and Milling. Published by National Twist Drill & Tool Co., Detroit. Pages 69, 5 x 7 1/2 in. Price, \$1.

The stated purpose of this book is to present data gathered during a long period of intimate contact with milling work in its various branches, together with the results of research work carried on at the University of Michigan within the last few years. The aim has been to present the data without bias toward existing designs or practices. It is felt that the book includes much pioneer work which should be of benefit alike to makers and users of milling cutters. The book is well written and well illustrated.

There are fifteen chapters, beginning with an outline of the development of milling, followed by the process compared with turning and planing. This includes data on the formation of a milling chip and the forces involved. A chapter on research equipment describes and illustrates the chip investigator and torque measurer. The subject of rake angles in milling cutters as determined by the research equipment is taken up quite fully, as well as the subject of clearance and spiral as factors in the elimination of chatter. Other chapters treat of the shape of teeth, chip space and number of teeth. A section on cutter design and its

effect on power requirements indicates the actual power saving effected by correct design and operation.

A chapter is devoted to feeds and another to cutter speeds. Consideration is given to the subject of lubrication and cooling, and the space devoted to the milling machine and its relation to the cutter point out the necessity of close co-operation between the maker of the machine and the maker of the cutter. Sharpening, handling and storage of cutters are outlined in a section on the care of milling cutters. The concluding chapter describes and illustrates the various types of cutters and their uses.

Practical Least Squares. By Ora Miner Leland, B.S., C. E. Dean of the College of Engineering and Architecture and the School of Chemistry, University of Minnesota. Cloth; pages xiv + 237, 6 x 9 in. Figures 40 + 8 plates of curves. New York: McGraw-Hill Book Co. Price, \$3.

It is particularly the chapters on empirical formulas which make this book of interest to mechanical engineers and economists. The development of curves from observations, and particularly the development of that one curve which will best fit the group of observations, is one which has long given engineers much trouble. Frequently one attempts to use a straight line running through a series of plotted points, while a curve of parabolic or similar form would often be preferable. The development of formulas in this and later chapters covers this feature, and shows how best to get the results desired. Methods are given of comparing the accuracies of different curves drawn for a series of plotted observations and determining, by the method of least squares, which curve is best representative of the observations under consideration.

Designed particularly for use in short courses of instruction, and by engineers and scientists in connection with their private work, the plan of this book is essentially practical. It takes up in detail a consideration of the character and occurrence of errors or irregularities in observations and the adjustment of direct, indirect and conditioned observations. This is illustrated by applications to triangulation and other requirements, mainly of civil engineering. The derivation of empirical formulas leads naturally into the determination of the best values of the unknown quantity, after which the precision of observations is discussed, together with the computation of the mean square and probable errors of the observations and results.

The work has numerous references to previous authors in this field and, by the use of tables, assists in the calculation of various results. In the appendix will be found a number of typical curves, with their equations.

The Una-Flow Steam Engine

Illustrated profusely by half tones and line cuts, this second edition of the work of J. Stumpf, professor of engineering in the Technical High School, Charlottenburg, Berlin, Germany, has been translated by the Stumpf Una-Flow Engine Co., Syracuse, N. Y. The work is, of course, devoted to the design and use of the una-flow arrangement as a means for reducing cylinder condensation in steam engines. The admission of steam into the cylinder at a central point, instead of at the two ends alternately, results in a flow of steam always in one direction, from the center toward each end. This reduces materially the changes in temperature at any given point along the length of the cylinder and thus gets away from one of the worst problems of the steam engine designer.

The first 118 pages, or over one-third of the 319-page book, are taken up with a consideration of steam engine losses. This has been done with characteristic German thoroughness and paves the way for the later portions of the volume.

Following the general consideration of engine losses is a chapter of about 100 pages dealing with the application of the una-flow principle to stationary engines of all descriptions. One section of this chapter, cov-

ering about 12 pages, is devoted to the use of una-flow engines for rolling mill purposes. Examples are given of engines built, under license from the Stumpf company, by the Mesta Machine Co., Pittsburgh. This section, as with the rest of the book, is heavily illustrated.

The last hundred pages cover discussions on una-flow locomotives, locomobile and portable engines, marine engines and special designs for special purposes.

One feature of the work, which makes it easy to revise the book, lies in the fact that the figure numbers begin all over again every time a new section or chapter is started. There are 362 figures in all, of which 20 are numbered Figure 1, as there are 20 separate sections in which figures appear. This is disconcerting to the reader and may perhaps be remedied in a later edition. In no case does any section have more than 74 figures, while the average is only 18. For the most part, the translators have given us results in inches and pounds of pressure. In a few cases, however, particularly in the text, the metric system has been left, as in the original edition. This mixture of two systems should cause little inconvenience to those accustomed to thinking under both headings.

Theory and Practice in Cutting Fluids

Cutting fluids is the subject of technologic paper No. 204, 42 pages, of the Bureau of Standards. The first part is devoted to theory. The difficulties attending the proper lubrication of the cutting tool are described and the reasons are set forth for lard oil's being particularly suitable for this work. It is shown that the viscosity of an oil is not the only factor to be considered. Oils for cutting purposes should have high adhesion. The possibility of improving mineral oils by adding oleic acid, pine oil and fixed oil is considered. In connection with cutting fluids used as coolant, the corrosion caused by water is mentioned and it is pointed out that where water is used soda or soap are always added. Part 1 suggests, in conclusion, a method for the measurement of the adhesion of oils.

The second part, dealing with practice, gives correspondence conducted by the bureau with large machine shops as to their experience with cutting fluids. The different kinds of oils that have been used are listed. Attention is given to the possibility of using emulsions made up of mineral oils compounded with neutralized sulfonated oil and formed into a permanent emulsion with water. Mineral oils compounded with alcoholic solutions of soap and a thick soap solution and mineral oil marketed as paste are described.

New Books Received

The Science of Purchasing. By Helen Hysell. Pages 261, 5 x 8 in.; illustrations 5. Published by D. Appleton & Co., 35 West Thirty-second Street, New York. Price, \$2.50.

Galvanizing and Tinning. By W. T. Flanders. Pages 328, 6 x 8½ in.; illustrations 134. Published by the U. P. C. Book Co., Inc., 243 West Thirty-ninth Street, New York. Price, \$4.

The A B C of Vacuum Tubes in Radio Reception. By E. H. Lewis. Pages, 171, 5 x 7½ in.; illustrations, 48. Published by Norman W. Henley Publishing Co., 2 West 45th Street, New York. Price, \$1.

How to Make Commercial Type Radio Apparatus. By M. B. Sleeper. Pages 191, 5¼ x 8 in.; illustrations, 96. Published by Norman W. Henley Publishing Co., 2 West 45th Street, New York. Price, 75 cents.

Foundrymen's Handbook. Pages, 309, 5¼ x 9 in.; illustrated. Published by Penton Publishing Co., Penton Building, Cleveland.

Probenahme und Analyse von Eisen und Stahl. Second edition. By Prof. O. Bauer and Prof. E. Deib, both of the Staatlichen Materialprüfungsamt Berlin-Dahlem. Pages 304, 6½ x 9¼ in.; illustrations 176, tables 140. Published by Julius Springer, Berlin W 9, Germany. Price, 118 marks.

NEW TRADE PUBLICATIONS

Hercules Drills.—A leaflet issued by the Whitman & Barnes Mfg. Co., Ashland, Ohio, gives the result of some tests on 13-16-in. Hercules drills in the Riter-Conley Mfg. Co.'s plant at Leetsdale, Pa. One of these drills has already produced the total of 46,000 holes in tank plate steel, a total production of 1916 ft., 8 in.

Cold Drawn Tool and Alloy Steel.—In a 24-page booklet, issued by the Pittsburgh Tool Steel Wire Co., Monaca, Pa., attention is drawn to the various types of tool steel and alloy steel, cold drawn by that company for various purposes. Prominent among the uses is that for needle bars, these being used for musical instruments, player pianos among others, and for various recorders and machines in a considerable list. Many special shapes are cold drawn either for stock or to order, one illustration showing about 20 odd shapes designed for special purposes. Drill rods form one important item in the product.

Forced and Induced Draft with Mechanical Stokers.—In a 20-page pamphlet the B. F. Sturtevant Co., Hyde Park, Mass., republishes a paper read before the Stoker Manufacturers' Association by H. F. Hagen. The paper is illustrated by curves of static and other head as observed during tests. The theory of the subject is developed, showing the amount of air required for various purposes.

Sturtevant Catalogs and Bulletins, February, 1922.—In a 12-page leaflet the B. F. Sturtevant Co., Hyde Park, Mass., lists current catalogs and bulletins under various headings and topics. About 70 titles are included.

Flexible Shafts and Equipments.—The N. A. Strand & Co., Chicago, catalog No. 22, 28 pages, 7¼ x 10½, illustrates and describes the portable motor-driven flexible shaft equipment of this company. Various attachments adapt these units to grinding, polishing, sanding, drilling, reaming, tapping, tire buffing, nut setting and screw driving.

Reactions.—A 20-page periodical published by the Metal & Thermit Corporation, illustrating and describing many applications of thermit welding. The elimination of blow holes in thermit welds by the use of new molding material and new style mold boxes, and how the cost of thermit-welding large sections of locomotive frames may be greatly reduced are discussed. Another item shows how the Garfield Smelting Co., Garfield, Utah, has been able to effect a large saving in the repair of ladle spouts by the thermit process.

Insulating and Soldering.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. A catalog supplement describing the company's house line of insulating and soldering compounds and announcing the extension of that line of products. The publication is known as 5-A, Supplement No. 2. The materials discussed are baking and air-drying varnishes, insulating compounds, finishing materials, including paints, enamels, lacquers, etc., insulating glue, soldering flux and lubricating oil.

Oil-Burning Metal Furnaces.—Caward Gaskill Furnace Corporation, 539 Monadnock Block, Chicago. General bulletin, 8¼ x 11 in., 8 pages. The company's line of crucible and non-crucible; pit, tilting and rocking type of pre-heated air-oil burning metal furnaces is described and illustrated.

Die Blocks.—In a 32-page booklet, the Sizer Steel Corporation, Buffalo, describes standardized die blocks made of electric steel and forged on four or six surfaces, as desired. Because of the standardization of these blocks, it is found possible to ship them on some 24-hr. to 4-day time after receipt of order. They are made in five different grades, each grade having both annealed and chilled blocks under it, with correspondingly varied hardness. Two grades are made of carbon steel, while the others are of nickel chrome steel. Instructions are given in the pamphlet for the treatment and use of the blocks by the purchaser. There are also given in the back of the pamphlet a number of mathematical and other tables, including weights of bar steel in various sections, while two pages are devoted to a table of weights of die blocks of various heights, widths and lengths.

Steam Turbine and Alternator Units.—Allis-Chalmers Mfg. Co., Milwaukee. Bulletin No 119 on "Steam Turbine and Alternator Units," covering high pressure condensing units.

Machinery Markets and News of the Works

SCHOOL LIST CALLS FOR 66 TOOLS

Joliet Board of Education Asks for Bids on Machines for Vocational Department

New Railroad Inquiries Appear, But Little Buying Is Being Done by the Carriers

Outstanding among machine-tool inquiries of the week as to size is that of the Joliet, Ill., Board of Education, which asks for quotations on 66 tools of various types, including about 20 of bench type.

The general machine-tool situation is spotty, some districts reporting improvement, while others have had less business than in weeks immediately preceding. A favorable development is that the call for new machines is now larger. Only recently second-hand tools had a decided preference on account of the low prices at which they were offered.

Prospects of railroad buying are in the foreground, but developments along this line are coming slowly. The Santa Fe road is expected to place orders at Chicago within a week or two against its several large inquiries of the past few months, but purchases by the Illinois Central and the Burlington, which also have made known their requirements, seemingly are not imminent. The Burlington is expected to issue another list shortly for equipping its Colorado shops, for which it is now inquiring for nine overhead cranes. The same

road is also in the market for two gantry cranes for its scrap yard at Aurora, Ill.

The Pennsylvania Railroad, which has let contracts for the construction of new repair shops at Pitcairn and Enola, Pa., has bought six hydraulic riveters, two air gap riveters, four punches, shears and other equipment, including six Niles 15-ton cranes; 30 cranes of 2-ton capacity will probably be placed this week. The Seaboard Air Line has inquired for one crank pin turning machine and two 30-in. engine lathes. The Newport News Shipbuilding & Drydock Co., Newport News, Va., has bought several large hydraulic machines for its new car department. The Erie Railroad, which inquired recently for 25 tools, is expected to place all or most of this business with a Cleveland dealer. The New York, New Haven & Hartford has inquired for two machines. The Central Railroad of Vermont may close shortly on a small list and the Rutland Railroad has received figures on two grinding machines and a wheel press.

One of the largest inquiries from the industrial field covers 15 machines required by the International Harvester Co., Chicago. The expected buying by the Studebaker Corporation, South Bend, Ind., which will be of fairly large proportions, has been postponed presumably because the necessary appropriation has not been provided. The machines are wanted for delivery by August 15. An automobile parts manufacturer has placed an order for 15 machines with a Cincinnati tool builder. The Endicott Forging & Mfg. Co., Endicott, N. Y., is in the market for a dozen or more tools.

New York

NEW YORK, June 13.

A slight improvement in the machine-tool trade is noticed. Conditions, however, are spotty, some sellers doing a fairly satisfactory business in certain lines, while others are doing comparatively little. Hopes are still entertained that railroad buying will soon assume larger proportions. The Erie Railroad, which has inquired for about 25 tools, including seven or eight engine lathes, a rod borer, a cylinder boring machine, a wheel press and horizontal and vertical grinding machines, will probably place an order for the entire list with a Cleveland dealer. The New York, New Haven & Hartford Railroad is inquiring for a boring mill and a boring bar. Other inquiries are expected soon from this road.

The Endicott Forging & Mfg. Co., Endicott, N. Y., has begun work on a brick addition, 40 x 50 ft., which affords more space for its die room and machine shop, and the following additional equipment will be installed: One 24-in. heavy duty Gould & Eberhardt shaper; one 16-in. shaper; one turret screw machine; one four-spindle drill press; one 8 x 16-in. tool-room lathe; also grinders, riveters, hand milling machines, power hack saw, thread-cutting machines and motors.

The Seneca Falls Mfg. Co., Seneca Falls, N. Y., has sold 10 "Short-Cut" lathes to the Every Day Piston Ring Co., Rochester, N. Y., and six to the Gill Mfg. Co., Chicago.

The large automobile plant of the Willys Corporation at Elizabeth, N. J., which was nearly ready for production of the Chrysler car when the severe business depression began in the fall of 1920, was sold at public auction last Friday to W. C. Durant, head of the Durant Motors Co., for \$5,525,000. It is said that the plant represents an investment of close to \$15,000,000. Mr. Durant announced that he purchased the plant to manufacture the new Star automobile. An initial production of about 500 a day is planned. It was reported several weeks ago that the Durant company has placed an order for approximately 100,000 Continental motors for the Star car.

Slightly greater activity in the crane market is noticed in this district, but price is still a great factor in purchases. Among the few recent inquiries is one from the Reading Iron Co., Reading, Pa., calling for prices on a used 10-ton electric traveling crane. Several inquiries that have been in the market for some time are still pending. The six 15-ton, 97-ft. span overhead traveling cranes inquired for by the Pennsylvania Railroad, Philadelphia, were awarded to the Niles-Bement-Pond Co., but the 30 double I-beam motor-driven cranes are still pending. The Otis Elevator Co., Yonkers, N. Y., has placed part of its crane list, including one 7½-ton, 17-ft. span electric crane and three 2-ton, single I-beam, 16-ft. to 19-ft. spans, with the Shepard Electric Crane & Hoist Co.

Among recent sales are: Niles-Bement-Pond Co., a 20-ton, 50-ft. span overhead traveling crane to the Truxillo Railroad Co., for export to Cuba; Whiting Corporation, a 20-ton, 31-ft. span gantry crane to the Southern Railway Co., San Francisco, Cal.; Industrial Works, a 40-ton locomotive crane to A. Guthrie & Co., St. Paul, Minn., a 20-ton locomotive crane to the Ryan Co., Chicago, and a 20-ton locomotive crane to Briggs & Turivas, Chicago; Shepard Electric Crane & Hoist Co., beside three cranes to the Otis Elevator Co., three 7½-ton and one 3-ton electric cranes to Horace T. Potts & Co., Philadelphia, and a 3-ton overhead traveling crane to the Florence Pipe Foundry & Machine Co., Florence, N. J.

The Transit Commission, 49 Lafayette Street, New York, has awarded a contract to the Rosenthal Engineering & Contracting Co., Jackson Street, Brooklyn, for the erection of a new car repair and inspection shop for the subway system, at Bronx Park and 180th Street, estimated to cost in excess of \$360,000, including equipment. George McNaney is chairman.

The New York Edison Co., 130 East Fifteenth Street, New York, will build a two-story addition to its power house at 100 Water Street. William Whitehall, Buckley-Newhall Building, Forty-first Street and Sixth Avenue, is architect.

Alexander A. Shumann, treasurer and assistant general

manager Trenton Malleable Iron Co., Trenton, N. J., has acquired the plant and business of the Albany Malleable Iron Co., Voorheesville, near Albany, N. Y. A company will be organized to operate the property, headed by Mr. Shumann, John H. Murray and Clifford E. Insley, all of Trenton, and the latter also connected with the Trenton Malleable Company, specializing in the manufacture of steam and electric railroad products. The present plant has a capacity of 50 tons a day, giving employment to about 250 men, and it is expected to increase the output in the future.

The Department of Plants and Structures, Municipal Building, New York, has filed plans for a one and two-story housing and repair works for the Department of Street Cleaning, 55 x 114 ft., at 27-31 Horatio Street, to cost about \$100,000. A similar works will also be constructed at Fifty-sixth Street and Twelfth Avenue, to cost close to \$350,000, including equipment. Grover A. Whalen is commissioner in charge.

The Wheeling Corrugating Co., 16 Desbrosses Street, New York, manufacturer of galvanized iron and steel products, has taken title to the block front on Nelson Avenue, from School to Van Dam Street, Long Island City, 180 x 300 ft., and will soon break ground for a six-story building for its Eastern branch works, 120 x 140 ft. William Higginson, 18 East Forty-first Street, is architect.

The Corrugated Rubber Co., 25 West Forty-third Street, New York, will take bids at once for the erection of the first unit of its proposed plant in the Fairview district, Poughkeepsie, N. Y., to be one-story, 60 x 200 ft., and estimated to cost about \$90,000. W. J. Beardsley, 49 Market Street, Poughkeepsie, is architect. W. L. Fairchild is manager.

The Studebaker Corporation, 1700 Broadway, New York, has acquired the four-story building at Broadway and Seventieth Street, heretofore held by the Winton Co., Cleveland, for an automobile service and repair works, to be operated as a branch of the main service department at Broadway and Fifty-fourth Street.

The Anaconda Copper Co., 25 Broadway, New York, is planning for the construction of a new lead and zinc plant at Akron, Ohio, and is said to have negotiations under way for a site. It is estimated to cost close to \$1,000,000, with machinery, and will be operated by its subsidiary organization, the International Lead Co.

The Argonaut Service Corporation, New York, has filed plans for a six-story automobile service works and machine shop, 100 x 200 ft., at 798-804 Eleventh Avenue, to cost about \$400,000. Albert Kahn, Marquette Building, Detroit, is architect. Frank J. Davis is president.

The Adirondack & Southern Power Co., Poughkeepsie, N. Y., has plans under way for a number of galvanized steel towers to be used in connection with a new 45-mile transmission system from Poughkeepsie to Catskill. O. H. Bundy is engineer.

Officials of the Columbian Carbon Co., and the Atlas Powder Co., 200 Fifth Avenue, New York, have organized the International Carbon Corporation under Delaware laws, with capital of \$2,500,000, to construct and operate a plant for the manufacture of carbon products.

The I. R. Gardinier Co., 1516 Kemble Street, Utica, N. Y., has filed plans for a two-story automobile service and repair works, 60 x 100 ft., to cost about \$60,000. I. R. Gardinier is president.

Bloomingdale Brothers, Fifty-ninth Street and Third Avenue, New York, have acquired the plant and garage of the Henry Elias Brewing Co., on East Fifty-fourth Street, 150 x 200 ft., and 100 x 100 ft., respectively, and will convert the property for a service and repair works for trucks and cars.

The Ford Motor Co., Highland Park, Detroit, is taking bids for a one-story assembling plant, 100 x 200 ft., for its automobile and tractor plant at Green Island, N. Y. Contracts has been let to Stone & Webster, 147 Milk Street, Boston, for the first unit of the main plant and work will commence at once. The entire plant will cost in excess of \$750,000, including machinery.

The Singer Sewing Machine Co., 149 Broadway, New York, has acquired a three-story building at 259-61 West Sixty-ninth Street, for a garage, service and repair works for company trucks and cars. The former two-story building used for this purpose at 116-18 West Fiftieth Street, has been sold.

The General Electric Co., Elkon Works, Gregory Avenue, Weehawken, N. J., is in the market for a second-hand rolling mill, for hot rolling, rolls 10 in. x 10 in. or larger.

The General Gas & Electric Corporation has been organized under Maine laws to take over the General Gas & Electric Co., 50 Pine Street, New York, operating public utility properties in New Jersey, Pennsylvania and Ohio. Extensions and improvements will be made in a number of electric generating plants and systems.

The New Jersey Concrete Products Corporation, Dover, N. J., has plans under way for a new factory. The Watson Engineering Co., 1270 Broadway, New York, is engineer.

The Standard Underground Cable Co., Washington Street, Perth Amboy, N. J., is taking bids for a three-story, brick and steel addition, 50 x 150 ft. Headquarters of the company are in the Westinghouse Building, Pittsburgh. Harry J. Lewis, 336 Fourth Avenue, Pittsburgh, is engineer.

Charles Miller & Co., 42 Secaucus Road, North Bergen, N. J., will commence the immediate erection of a two-story refrigerating and cooler plant, 50 x 100 ft., to cost about \$50,000.

The Superior Skylight Co., 456 Fourth Avenue, New York, manufacturer of metal skylights, etc., will install a number of drill presses, punches and shears, and other equipment.

The Shaw Insulator Co., 5 Kirk Place, Newark, has acquired a two-story, reinforced-concrete factory, 50 x 100 ft., at 146 Colt Street, Irvington, for the establishment of a new plant to manufacture wireless equipment and parts.

W. A. Schuette, 132 Third Street, Union Hill, N. J., is completing plans for a two-story automobile service and repair works, 50 x 105 ft., at Main Street and Hudson Boulevard, estimated to cost about \$50,000. Joseph D. Lugosch, 21 Bergenline Avenue, is architect.

Philadelphia

PHILADELPHIA, June 12.

The Hill Independent Mfg. Co., Adams and Emerald streets, Philadelphia, manufacturer of metal stamps, etc., has awarded contract to Isaac A. Hopper's Sons, 15 East Fortieth Street, New York, for an addition to its plant at Belfield and High streets to cost about \$13,000.

The L. A. Prouty Co., Inc., 1029 Ridge Street, Philadelphia, Pa., manufacturer of soda fountains and fixtures, has acquired property, 182 x 185 ft., at Thirty-third and Arch streets, as a site for a new plant.

Osman & Holman, 121 West Wyoming Street, Philadelphia, are taking bids for a two-story automobile service and repair works, 90 x 125 ft., at Green Street and Queen Lane, to cost about \$60,000.

The Crawford Co., 27 South Fourth Street, Philadelphia, manufacturer of pipe hangers, etc., has had plans prepared for a new machine shop at 1538 Wood Street. The Balingier Co., Twelfth and Chestnut streets, is architect.

The Jones Machine Works, Fifty-third Street and Lansdowne Avenue, Philadelphia, is having plans prepared for a one-story machine shop at Primos, Pa., 60 x 200 ft., estimated to cost about \$50,000.

The Sun Co., Finance Building, Philadelphia, will rebuild the portion of its oil refinery at Marcus Hook, Pa., recently destroyed by fire with loss of about \$65,000. The new building will be 75 x 168 ft.

The Champion Incandescent Light Co., 235 Market Street, Philadelphia, manufacturer of gas fixtures, etc., has filed plans for an addition to cost about \$10,000.

A vocational department will be installed in the new high school to be erected at Bridgeton, N. J., for which bids are being asked until June 21. Ritter & Shay, North American Building, Philadelphia, are architects.

The Reading Knob Works, Reading, Pa., manufacturer of metal specialties, is having plans prepared for two one-story additions, each 30 x 50 ft. C. B. Mongel, 1122 Pennsylvania Avenue, Wyomissing, Pa., is architect.

The Harrisburg Pipe & Pipe Bending Works, Harrisburg, Pa., will make improvements in its power house to cost about \$50,000.

Gehret Brothers, Bridgeport, Pa., operating a structural steel and iron works, have plans under way for the erection of a one-story addition, 125 x 140 ft., estimated to cost about \$40,000. Charles Gehret is head.

The American Welding Co. and the Carbondale Machine Co., Carbondale, Pa., are planning to rebuild the portion of their works destroyed by a flood June 3, with combined loss approximating \$200,000, including equipment. The same storm also damaged the machinery and property of the Hudson Coal Co., with loss of about \$500,000, and the Delaware & Hudson Co., coal plant, with loss of approximately \$50,000, both at Carbondale.

The constructing quartermaster, United States Army, Camp Summerall, Tobyhanna, Pa., will build a new machine shop and power house at the local army camp.

The Roberts & Mander Stove Co., Eleventh and Washington streets, Philadelphia, has had plans prepared for a new works at Hatboro, Pa. The Austin Co., Bulletin Building, is architect.

The Philadelphia Rapid Transi Co., 810 Dauphin Street,

Philadelphia, will build an addition to its repair and inspection shop at Frankford and Bridge streets.

James J. H. McNally, Camden, N. J., is negotiating with the city council for the vacation of Fifth Street, on the river front, to allow for the erection of a new plant between Fourth and Sixth streets to manufacture American Diesel engines and parts and estimated to cost in excess of \$300,000. Mc McNally owns the land and is interested in the new company to be formed for construction and operation.

F. P. Gravatt, Atlantic Apartments, Atlantic City, N. J., is having plans prepared for the erection of a one-story automobile service works and machine shop, 110 x 150 ft. L. R. Barber, Guarantee Trust Building, is architect.

The Jespersion Newsprint Co., Lambertville, N. J., will remodel the machinery and install new equipment at the plant of the Perseverance Paper Co., recently taken over to manufacture newsprint paper from old stock. Henry Weeks is treasurer and general manager.

Thomas Golden, 315 North Center Street, Pottsville, Pa., will build a two-story automobile service and repair works, 80 x 100 ft., at Second and Center streets.

The School Board, Orangeville, Pa., will build a new vocational school to serve the borough and Orange Township.

A vocational department will be installed in the two-story high school, 90 x 135 ft., to be erected on Belvidere Street, Nazareth, Pa., for which bids are being asked until June 19. Rasmusson & Wayland, 542 West Fort-sixth Street, New York, are architects.

A vocational department will be installed in the two-story and basement high school, 75 x 130 ft., to be erected at Glenolden, Pa. Clarence W. Brazier, Crozer Building, Chester, Pa., is architect.

New England

Boston, June 12.

Machine tool business in this territory showed no expansion the past week, and again was largely confined to used equipment. There were, however, more new tools sold than during the previous week and indications are that more equipment will change hands before the close of June. Sales include one used 12-in. and one used 14-in. lathe, a used cutter grinder and a new 14-in. shaper by a central Massachusetts manufacturer for a vocational school department; three medium sized used power presses to a central Massachusetts firm; a new crank planer to a Brockton, Mass., interest; a large horizontal boring machine to a western Massachusetts plant, a used tool but costing well up in four figures; a used broaching machine to another western Massachusetts metal working interest; a used 20-in. shaper to a Lowell firm; a used 16-in. x 6-ft. Pratt & Whitney tool room lathe to a New Hampshire experimental station, and a new 1 13/16-in. screw machine to a Providence plant.

Within the next fortnight it is anticipated the Central Vermont Railroad will close on a small list of equipment; the Rutland Railroad on two motor driven grinders and a 48-in. wheel press; Berlin, N. H., officials on equipment for the high school, involving about \$17,000; a Vermont marble concern on a 20-ton and a 40-ton crane, and the Narragansett Lighting Co., Providence, on its crane requirements. In addition, numerous single machines probably will be taken within the next two weeks and a Lowell, Mass., school list is in the making. With the exception of those quoted on planers, prices for new machine tools appear steadier.

The demand for machine tool parts and small tools holds up well. Sales of abrasive wheels are expanding. In this respect it is noteworthy that plant No. 6 of the Norton Co., Worcester, idle two years, is in operation with 150 employees, turning out grinding wheels. This plant was built during the war for excess business and is complete for abrasive wheel production.

The Keystone Mfg. Co., 53 Wareham Street, Boston, is in the market for one or two high speed riveting hammers, 1/4-in. capacity. The Factory & Mill Supply Co., 137 Oliver Street, Boston, has purchased the mechanical equipment of the Conley & McElroy Mfg. Co., Beverly, Mass., including drop hammers, lathes, drill presses, milling machines, etc.

Plans have been made for enlarging the plant of the Warren F. Fraser Co., Brigham Street, Westboro, Mass. The company is working day and night on piston pins, carburetors and grinding machinery. Alfred E. Box is superintendent, and Herbert S. Inge, engineer.

The Connecticut Instrument Co., capitalized for \$100,000, has leased the plant of the Lounsbury & Soule Co., Stamford, Conn., in which radio and engineering devices will be manufactured. The company succeeds the Allen-Hogan Co.,

Brooklyn, and will move its machinery and equipment to Stamford. R. E. Gillmore is president and treasurer.

The Acme Wire Co., Hamden, Conn., is planning to increase its activities by the manufacture of static electric condensers. The exclusive right to manufacture these in this country and in Canada has been obtained from French interests. The condensers are applied to the correction of low power plants where alternating current is used for power purposes.

The estate of Emory G. Smith is offering for sale the plant, equipment and business of the Star Mfg. Co., 71-77 Willard Avenue, Providence, R. I., malleable iron unions. Bids will be received until 5 p. m., daylight saving time, June 15.

Arrangements have been completed whereby the Lee Rule & Level Co. will occupy space formerly used by the Waltham Watch Co., on Chapman Street, Greenfield, Mass. The company will manufacture a new combination tool embracing a rule, level, square and straight edge all in one. H. E. Lee is the inventor and president of the company; F. Anderson, vice-president and treasurer, and H. H. Hawkins mechanical engineer.

The Cooley Motor Co., Enfield Street, Thompsonville, Conn., has purchased a brick monitor building on Elm and Enfield streets, and plans extensive alterations and additions to the property.

The Middlesex Machine Co., Paige Street, Lowell, Mass., manufacturer of metal plumbing specialties, has filed plans for a new one-story factory, 50 x 75 ft., to cost about \$22,000.

Hobson & Metzger, North Avenue, Meriden, Conn., have plans in preparation for a new one-story machine shop on property recently acquired.

The Central Falls Mfg. Co., Lincoln Falls, R. I., operating a wood-working plant, will build a two-story addition, 40 x 60 ft.

The Pejepscot Paper Co., Topsham, Me., has tentative plans under way for extensions in its mills at Pejepscot and Bowdoin, Me., to cost close to \$1,000,000, including machinery. Edgar Rickard is president, and Fred C. Clark, vice-president and general manager.

A one-story power house will be erected by the Tweedy Silk Mills, Inc., Danbury, Conn., in connection with other additions.

James Sullivan, 50 Granite Street, Manchester, N. H., will build a one-story automobile service and repair works on Granite Street, 54 x 120 ft. J. Edward Baker, Elm Street, is architect.

The Rutland Sash & Door Co., Strongs Avenue, Rutland, Vt., will build an addition to its plant to cost about \$50,000, including woodworking and other machinery. F. H. Remington is general manager.

The Segal Metal Products Co., Springdale, Conn., manufacturer of locks, etc., has awarded contract to the T. J. Pardy Construction Co., Bridgeport, Conn., for a three-story and one-story addition 30 x 128 ft., and 40 x 45 ft., respectively, to cost about \$35,000.

The Waterville Motor Co., Waterville, Me., has filed plans for a two-story and basement service and repair works, 52 x 65 ft. on Bangor Street.

The Utilities Power Co., Concord, N. H., has plans under way for a hydroelectric power plant on the Pemigewasset River, estimated to cost close to \$1,000,000, with machinery.

A vocational department will be installed in the new junior high school to be erected at Waterville, Me., estimated to cost about \$150,000.

Buffalo

BUFFALO, June 12.

The Brockway Motor Truck Co., Cortland, N. Y., has plans under way for the erection of a one-story service and repair works on Court Street, Rochester, N. Y., 50 x 176 ft.

The Seneca Transmission Co., Collins, N. Y., has made application for permission to construct a new local electric power plant.

The Silica Products Co., North State Street, Lowville, N. Y., has preliminary plans under way for a new plant to cost about \$100,000, including machinery.

Louis P. Reimann, 69 North Division Street, Buffalo, will build a new one-story machine shop.

The Buffalo General Electric Co., Electric Building, Buffalo, will build a new one-story power house at Main Street and Hertel Avenue.

The Beaver Products Co., Beaver Road, Buffalo, recently organized as a subsidiary of the Beaver Board Companies, Inc., manufacturer of wall board products, has disposed of a bond issue of \$2,000,000, a portion of the proceeds to be used for expansion. B. L. Worden is president of both organizations.

The Webster Co-operative Cold Storage Association, Webster, N. Y., organized as an interest of the Webster Fruit Growers' Co-operative Association, has awarded a contract to the Fred T. Ley Co., 19 West Forty-fourth Street, New York, for a four-story cold storage and refrigerating plant, to cost close to \$200,000, including machinery.

The A. W. Jack Corporation, Mill Street and North Transit Road, Lockport, N. Y., manufacturer of asbestos products, has awarded a contract to the J. W. Cowper Co., Fidelity Building, Buffalo, for a new one-story plant, 128 x 500 ft., to cost close to \$500,000, including equipment.

A. R. Ziebarth, 217 Leroy Avenue, Buffalo, is arranging for the installation of machinery in a local building to manufacture metal automobile bodies.

The American Super-Power Corporation, Lewiston, N. Y., recently organized, has made application for permission to construct and operate a hydroelectric generating plant in this vicinity. It will have an output of about 45,000 hp. and with steel tower transmission system, totaling several hundred miles, the project is estimated to cost in excess of \$30,000,000. The company is headed by Edward G. Randall and A. M. Layton, Buffalo, and J. Boardman Scovell, Lewiston. Frederick W. Ballard, head of F. W. Ballard & Co., 811 Swetland Building, Cleveland, engineers, is an official of the new company and chief engineer.

The Deer River Power Co., Copenhagen, N. Y., will establish a field machine shop in connection with new construction work, with equipment to include a portable forge and blower, electric drill, etc.

A vocational department will be installed in the new high school to be erected at Attica, N. Y., estimated to cost in excess of \$175,000, for which Miller & McNeil, 31 Root Building, Buffalo, are architects.

Pittsburgh

PITTSBURGH, June 12.

Local representatives of cranes and machinery equipment concerns state that the coal strike is interfering with prospective sales to some extent. Companies having inquiries out for equipment or contemplating sending them out are now giving most of their time to finding supplies of coal, and in some cases purchasing agents are making trips to different coal fields trying to place orders. This condition will likely last until the coal strike is settled, but it means an accumulation of orders for machinery that are likely to be placed very soon after the strike is out of the way.

Much prospective business in machinery is in cranes, for which there are many inquiries. One local house is figuring on no less than 80 cranes of various sizes and expects that a good part of these will be placed within the next month or two. Engineers are sending out requests for estimating prices, and a good deal of business is certain to be closed over the second half of the year, probably some of it not until late in the year.

The Pennsylvania Railroad some time ago sent out requests for bids on six 15-ton cranes and 30 2-ton cranes. The six 15-ton cranes have been placed with the Niles-Bement-Pond Co. This road put out an inquiry last week for a 90-in. wheel driving lathe and for other small miscellaneous equipment.

The Seneca Wire & Mfg. Co., Fostoria, Ohio, placed an order last week with a local interest for a 5-ton crane. The local office of the Shepard Electric Crane & Hoist Co. reports business active and has closed for a 1-ton and a 2½-ton a.c. hoist for the Logan Island Creek Coal Co., Crites, W. Va., also for two 2-ton a.c. hoists for the Pittsburgh Coal Washer Co. and a 5-ton, 2-motor, pulpit control, electric hoist for the Homestead Steel Works; a 4-ton electric hoist for upper union mills, Carnegie Steel Co., Youngstown, Ohio; a 2-ton electric hoist for the Fort Pitt Bridge Works, Canonsburg, Pa.; a 3-ton, 2-motor, pulpit control electric hoist for the Columbia Steel & Shafting Co., Carnegie, Pa.; a 2-ton hoist for the Marion Machine, Foundry & Supply Co., Scottdale, Pa. and a 12-hp. electric car handling winch for the National Tube Co., Lorain Works. The local office of Northern Engineering Works, Detroit, has sold to the Resistant Alloy Casting Co., New Cumberland, W. Va., a 5-ton 3-motor electric traveling crane with 48-ft. span.

Local builders of heavy iron and steel works machinery report new inquiries the past week or two as much better. One local company has received recently several orders for roll lathes, straightening machine, heavy-duty shears and other steel works equipment, and is figuring on considerable more business.

The Niagara Falls Power Co., Niagara Falls, N. Y., has placed orders for three 70,000-hp. hydroelectric units. One was placed with Allis-Chalmers Co., Milwaukee, complete, and consists of one 70,000-hp. wheel with 52,500-kw. generator. The General Electric Co. took the contract for the

other two 52,500-kw. generators and I. P. Morris, Philadelphia, received the contract for the two wheels of 75,000-hp. capacity to drive the above two generators. The Allis-Chalmers Co. has taken the contract for about \$150,000 worth of butterfly valves for hydraulic service for delivery at Niagara Falls, N. Y., and has also the complete contract for pumping engines for the City of Minneapolis, each of the engines to have a daily capacity of 20,000,000 gals.

The National Pump & Machine Co., Oil City, Pa., has work under way on a new one-story foundry. The present working force will be doubled.

A one-story power house will be constructed by the Chesebrough Mfg. Co., 17 State Street, New York, in connection with its new three-story vaseline plant at McKees Rocks, Pa., estimated to cost about \$500,000. The Hunting-Davies Co., Century Building, Pittsburgh, is architect.

Fire, June 8, destroyed a portion of the plants of the Young Paper Mfg. Co., Thirty-fourth Street and the Allegheny Valley Railroad, and the foundry of the Pittsburgh Malleable Iron Co., Thirty-fourth and Smallman streets, Pittsburgh, with loss estimated at \$100,000 and \$50,000, respectively. It is planned to rebuild.

The South Penn Oil Co., 424 Sixth Avenue, Pittsburgh, is arranging a list of equipment for installation at its gasoline manufacturing plant, now in course of erection at Van, Pa. The company has acquired the property of the Eddystone Oil Corporation in West Virginia for \$1,000,000, and the present output of about 250 bbl. a day will be increased. Arrangements have been made for the installation of 20 new steel storage tanks, each with capacity of about 75,000 bbl., estimated to cost \$1,500,000.

A one-story power plant will be constructed by the American Borax Co., E. L. Dawes, president, care of the Standard Sanitary Mfg. Co., Bessemer Building, Pittsburgh, in connection with its new factory at Rochester, Pa., estimated to cost about \$90,000.

The Cumberland Iron Co., Huntington, W. Va., has been organized by A. B. Day, Knoxville, Tenn., and associates, to take over and operate the local plant of the State Mine Car & Foundry Co. Improvements will be made in the plant and equipment.

The Shawner Construction Co., Lansing, W. Va., has completed plans for a new one-story factory to manufacture concrete blocks, bricks, etc. A list of machinery is being arranged, to include stone crusher, planer, power equipment, etc. J. A. Ellison is general manager.

The Island Creek Coal Co., Holden, W. Va., has plans under way for the construction of two mining plants, including tripplers, etc., in connection with the opening of new properties.

The Seward Wire Co., Parkersburg, W. Va., recently organized with a capital of \$150,000, has awarded a contract to Platt & Vogel, Parkersburg, for a factory, 80 x 200 ft., to manufacture insulated wire products. Thomas J. Seward, head of the T. J. Seward Co., 17 West Forty-second Street, New York, is president and engineer.

The Hammond Bag & Paper Co., Wellsburg, W. Va., recently organized with a capital of \$500,000, has plans under way for a new paper mill, 120 x 500 ft., estimated to cost in excess of \$200,000, including machinery. T. H. Hammond is president, and M. J. Davis, secretary.

The Wolf Coal Co., Wheeling, W. Va., has completed plans for the construction of a new tippie at its plant.

The Star Foundry & Machine Co., Sharon, Pa., recently organized, has taken over the plant of the Turner-Frick Gas Engine Works, and will continue operations for the manufacture of gas engines and parts. J. A. Turner, Frederick Lutz and Joseph Stahl head the new company.

The Huntington Water Corporation, Huntington, W. Va., is arranging for a new electrically-operated pumping plant to cost about \$50,000, including equipment.

The Princeton Automobile Accessories Co., Princeton, W. Va., recently organized, is planning for the installation of equipment in a local building for light metal-working, including lathes, polishing equipment, brass melting apparatus, etc. R. F. Forkner is president and general manager.

W. O. Hundley, Huntington, W. Va., has acquired property on Eighteenth Street, for a one-story automobile service building, with machine shop, to cost about \$50,000.

The DuRoth Steel Truck & Car Wheel Co., Pittsburgh, has planned to locate at Osgood, Pa., where it expects to erect a plant for the manufacture of railroad and street car trucks. The estimated cost of building and equipment is about \$1,000,000.

The Colonial Steel Co., Keystone Building, Pittsburgh, has plans nearing completion for a new furnace and heat-treating building on site recently acquired on St. Clair Avenue, Cleveland.

Chicago

CHICAGO, June 12.

Machine tool buying shows little change in volume, but inquiries are still liberal. The Joliet, Ill., Board of Education has put out an extensive list to be purchased between now and September. Expected orders from the Studebaker Corporation, South Bend, Ind., are held up pending the approval of an appropriation to defray their purchase. These tools will be bought for delivery by Aug. 15. The International Harvester Co. is in the market for several special machines, including five Reed turning lathes for small machine work, three gear hobbors, one automatic grinding machine for ball races, two Blanchard vertical grinding machines and four universal grinders. The Green Engineering Co., East Chicago, Ind., is in the market for two heavy duty drilling machines and a double disk grinder. It now appears that the Santa Fe may place orders against its list within the next week or two. Purchases by the Illinois Central and the Burlington, however, do not appear to be imminent. Current orders have been generally small. The Michigan State Reformatory has bought a No. 1 universal milling machine and a 16-in. engine lathe. The C. G. Spring Co., Kalamazoo, Mich., has ordered six polishing lathes from a Chicago company. The Joliet Board of Education list is as follows:

Twelve 14-in. x 6-ft. Hendey or American engine lathes with quick change gears and taper attachment.

Twelve 14-in. x 6-ft. standard engine lathes.

One American or Hendey tool room lathe.

One 4-in. centering machine.

One 8-in. x 36-in. universal grinding machine.

One small surface grinder.

Six No. 2 universal milling machines.

Two duplex No. 2 milling machines.

One 30-in. vertical boring mill.

One 30-in. x 30-in. x 6-ft. planer with one head on cross rail.

Eight 16-in. shapers.

One small hardening furnace.

One No. 2 turret lathe.

One 2½-in. drill grinder.

17 bench vises with swivel cases.

The Burlington is expected to issue another machine tool list soon for its new Denver, Col., shop. It has already entered the market for cranes for this plant, the list calling for two 225-ton cranes, three 15-ton cranes, two 50-ton cranes, two 10-ton cranes. This road is also inquiring for two gantry cranes, 105 ft. between legs and 155 ft. overall for its Aurora, Ill., scrap yard.

The Cadillac Foundry Co., Cadillac, Mich., has purchased four tumbling barrels from the Whiting Corporation for its new foundry.

E. Edelmann & Co., manufacturers of automobile accessories are having plans drawn for a two-story factory to cost \$250,000 to be erected on a site recently purchased at the southwest corner of Logan Boulevard and Holly Avenue, Chicago. Three years ago this company erected a factory on Crawford Avenue, which it recently sold to Bassick & Co.

The Ideal Sheet Metal Works, manufacturer of automobile and aeroplane supplies, Fulton and Morgan streets, Chicago, has purchased a site at 2039-43 West Jackson Boulevard, where it plans to erect a three-story factory to cost \$75,000.

The Standard Oil Co. will erect a service station for trucks at the southwest corner of Grand Avenue and Orleans Street, Chicago, to cost \$65,000.

The city of Hammond, Ind., has awarded contracts for the construction of a pumping station, boiler house and tower in connection with its waterworks, to cost \$100,000.

Hetzel & Co., packers, 1739 Larrabee Street, Chicago, will build a one and two-story power house, 69 x 122 ft., at 1744-48 Mohawk Street, to cost \$50,000.

The welding and machine shop of the Effingham Welding & Machine Co., Effingham, Ill., of which L. Finkeldei & Son are proprietors, has been completed and is open for business.

The Sullivan Machinery Co., Chicago, manufacturer of mining and oil well machinery, has let contract for a plant at LaPorte, Ind., to cover four acres.

The Maremont Mfg. Co., manufacturer of motor truck bodies, wagons and automobile springs, 916 South Wabash Avenue, Chicago, has bought from the Otis Elevator Co., property on the southeast corner of Ashland Avenue and Sixteenth Street, which is improved with a one-story factory now occupied by the buyer.

The Calumet Tank & Mfg. Co., Hammond, Ind., is planning the erection of a one-story foundry, 60 x 140 ft., to cost \$75,000.

The Kewanee Boiler Co., Kewanee, Ill., has leased a two-story building to be erected at Washington Boulevard and Green Street, Chicago, for a factory branch.

The N. O. Nelson Mfg. Co., Tenth and Chestnut streets, St. Louis, manufacturer of pipe, plumbing equipment, etc., is taking bids for a new two-story plant, 60 x 100 ft., on East Third Street, Davenport, Iowa, estimated to cost about \$40,000. Temple & Burroughs, 63 Davenport Savings Bank Building, are architects.

A vocational department will be installed in the two-story high school to be erected at Edgewood, Iowa, plans for which will be completed early in July. Bartley & Pedicord, L. & J. Building, Waterloo, Iowa, are architects.

A vocational department will be installed in the new high school to be erected at Tuttle, N. D. Gilbert R. Horton, Citizens' National Bank Building, Jamestown, N. D., is architect.

The United Light & Railways Co., Davenport, Iowa, is arranging for an increase in capital from \$30,000,000 to \$50,000,000, a portion of the proceeds to be used for power plant extensions and improvements.

A vocational department will be installed in the new high school to be erected at Fort Madison, Iowa, estimated to cost in excess of \$150,000, for which bids will be received until July 10. Owen, Payson & Carswell, American State Bank Building, are architects.

The Duluth & Iron Range Railroad Co., Duluth, Minn., has tentative plans under consideration for a one-story and basement tin and metal-working plant at Two Harbors, Minn.

Motors, power and conveying machinery, etc., will be installed in the new meat-packing plant to be erected by Roberts & Oake, Forty-fifth Street and South Racine Avenue, Chicago, estimated to cost close to \$500,000.

Electric pumping machinery and other equipment will be installed at the waterworks plant, Grand Junction, Col., in connection with extensions and improvements to cost about \$175,000. Burns & McDonnell, 402 Interstate Building, Kansas City, Mo., are engineers. George Garrett is city manager.

The Northwestern Public Utilities, Inc., Joliet, Ill., S. C. Hopkins, secretary, has plans under way for extensions in its system and plants at Glendive, Terry and Miles City, Mont., to cost in excess of \$1,200,000, including equipment.

The City Council, Huron, S. D., has plans under way for extensions and improvements in its electric power plant and system, to cost about \$100,000, including equipment. J. H. A. Brahtz, 409 Metropolitan Opera House Building, St. Paul, Minn., is engineer.

Baltimore

BALTIMORE, June 12.

The C. L. Seyler Lumber Co., Bluefield, W. Va., is planning to purchase equipment for its new plant in the vicinity of Graham, Va., to consist of a light locomotive and rails for a logging line, saw mill machinery, wood-working equipment, etc. The company has acquired a tract of over 700 acres. C. L. Seyler is general manager in charge.

The Consolidated Gas, Electric Light & Power Co., Lexington Building, Baltimore, is disposing of a bond issue of \$10,000,000, the proceeds to be used in part for extensions and improvements, and additions to working capital. Herbert A. Wagner is president.

The office of the constructing quartermaster, Fort Monroe, Va., will receive bids until June 20, for a machine shop at the Langley Field, Va.

The Tin Decorating Co., Boston Street and Linwood Avenue, Baltimore, manufacturer of tinware, has filed plans for a new one-story building, 21 x 195 ft.

The Palmetto Power & Light Co., Raleigh, N. C., will make extensions and improvements in its power plant and system at Florence, S. C., to cost about \$80,000. P. A. Tillery is vice-president and general manager.

The Baltimore & Ohio Railroad Co., Baltimore, is planning for the installation of a steel bar roughing plant at its reclamation works at Cumberland, Md.

The City Council, Enfield, N. C., will commence the immediate construction of a municipal power plant.

A vocational department will be installed in the two-story and basement high school, 75 x 190 ft., to be erected at Thomasville, N. C., estimated to cost about \$210,000, bids for which will be asked at once. Harry Simonds, Latham Building, Greensboro, N. C., is architect.

The Fibre Board Container Co., 3200 Williamsburg Avenue, Richmond, Va., is planning for enlargements in its plant and the installation of new equipment to double, approximately, the present capacity. D. J. Donati is president.

The General Purchasing Officer, Panama Canal, Washington, will receive bids until June 19, for bronze, copper and brass valves; platform scale and other material, as set forth in circular 1483. A. L. Flint is general purchasing officer.

The Case-Fowler Lumber Co., Macon, Ga., has preliminary plans under way for the rebuilding of the portion of its plant at Crump Park, including saw mill, destroyed by fire, May 23, with loss estimated at about \$75,000. The new building, with machinery, will cost approximately a like amount.

The Harris Motor Co., Pulaski, Va., has plans under way for the erection of a new service building, with machine shop, at Fourth Street and Washington Avenue.

The Big Bend Power Co., Scottsville, Va., has tentative plans under consideration for a hydro-electric generating plant on the James River.

Ovens, power equipment, conveying machinery, etc., will be installed in the new two-story and basement baking plant, 50 x 250 ft., to be erected by the American Bakeries Co., Macon, Ga. Happ & Shelverton, Macon, are architects.

The Board of Directors, Friends' School, Park Avenue and Lawrence Street Baltimore, has awarded contract to the Whiting-Turner Construction Co., 427 North Lombard Street, for a new two-story mechanical and woodworking plant, estimated to cost about \$50,000. Edward C. Wilson is principal.

Edward T. Brown, Newmarket, Va., is organizing a company to construct and operate a hydro-electric power plant on Pitt Springs Run with system for furnishing light and power in this section.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until June 20, for 498 metal clothes lockers for use at Lakehurst, N. J., as specified in schedule 9704; also, for 8470 lb. of cold rolled copper bars and rods, as specified in schedule 9698, for use at Portsmouth, N. H.

The Atlanta Casket Co., P. O. Box 693 Atlanta, Ga., is arranging a list of equipment to be installed in its new steel casket manufacturing plant, now in course of erection. N. P. Cannon is president.

Cleveland

CLEVELAND, June 12.

Reports generally indicate that the machinery market was less active the past week than during the previous few weeks, although some dealers did a good volume of business, but buying was mostly in single machines. There were no developments in some of the pending prospects involving fair sized lots of machines. A local dealer is figuring on the Erie Railroad list of 25 tools which have not yet been purchased. Another dealer sold five used automatic screw machines to a New England plant and an order for two power presses came from the automobile industry. One dealer handling both new and used machinery reports that 75 per cent of sales during May were new tools, showing, as compared with recent months, a considerable increase in the demand for new machines over used tools.

A power plant will be erected at the Ohio Northern University, Ada, Ohio, the trustees having authorized an expenditure of \$30,000 for that purpose.

The Buckeye Castings Co., Lima, Ohio, will enlarge its plant and add a steel foundry to its gray iron foundry. Four buildings will be erected, including a main building, 35 x 100 ft., and a cleaning department and storage warehouse.

The Miami Tractor Co., Celina, Ohio, has been reorganized with E. J. Brookhart president, J. C. Drill, vice-president, and O. Rentzsch, secretary. Efforts will be made to provide sufficient capital to place the plant within operations.

The Union Chain & Mfg. Co., Seville, Ohio, has commenced the removal of its plant to Sandusky, Ohio.

The Weldless Tool Co., Wooster, Ohio, recently incorporated, has acquired a site and contemplates shortly the erection of a plant to manufacture weldless steel tubing. Several men identified with the Woodard Machine Co., Wooster, including L. A. Woodard, president, are interested in the new company.

Cincinnati

CINCINNATI, June 12.

For the past two weeks a let up has been noticeable in orders placed with local machine tool manufacturers. Inquiries, too, seem to have fallen off to a great extent, and the market is described as spotty. A number of fairly good orders, however, have been placed. The Studebaker Corporation has been a purchaser of machines for its South Bend plant and is expected to buy a large number in the near future. An automobile parts manufacturer placed an order with a local manufacturer for 15 machines. With these exceptions the majority of orders were for single tools. Manufacturers of machines other than those commonly termed machine tools, report fair activity, and some large orders for road building machinery have

been placed with manufacturers in this district. Conveying machinery manufacturers are running at approximately 75 per cent of capacity, while builders of wood-working, laundry and baking equipment are also running at a fair percentage of capacity. There is some activity in the crane and hoist market, the Central Supply Co., Indianapolis, having purchased a 5-ton traveling crane from an Indiana builder.

Sale of the Allen Motor Co.'s properties at Columbus and Bucyrus, Ohio, will take place on June 27-29, the Columbus plant being offered on the 27th and 28th and the Bucyrus plant on the 29th. The property will be sold either in groups or as a whole.

The Underwood Furnace Co., Dayton, Ohio, has been incorporated with a capitalization of \$5,000 to manufacture furnaces used in brick kilns. C. P. Folsom and A. V. Howell, both of Dayton, are the principal incorporators. Plans for production have not been completed as yet, but it is expected that operations will begin within a month or six weeks.

W. D. Scott & Sons, manufacturers of high pressure ventilating fans and repair parts for coal mining machinery, have removed their plant from Martins Ferry, Ohio, to South Zanesville, occupying the former Gearwood works plant. W. D. Scott is president.

The Dayton Veneer Co., Dayton, Ohio, incorporated with a capitalization of \$150,000, has taken over the holdings of the Frye Lumber & Veneer Co. J. W. Frye is president and A. E. Snyder, secretary.

Indiana

INDIANAPOLIS, June 12.

The Hartford Foundry Co., Hartford City, Ind., has filed plans for a new foundry 40 x 80 ft.

The Bloomington Stone Crusher Co., Bloomington, Ind., is planning to rebuild its stone crushing plant destroyed by fire June 4. New equipment will be installed. Ralph Rogers and A. F. McCormick head the company.

A vocational department will be installed in the two-story and basement junior high school to be erected at Columbus, Ind., estimated to cost about \$100,000, for which bids are asked until June 19. Norman G. Hill, 915 State Life Building, Indianapolis, is architect.

Fire June 3, destroyed the car barns and shop department of the Southern Indiana Gas & Electric Co. Evansville, Ind., with loss estimated at about \$150,000, including equipment and stock.

The New Process Steel Co., Noblesville, Ind., is completing the erection of its plant and plans to begin operations early in July, giving employment to about 100.

The Studebaker Corporation, South Bend, Ind., has awarded contract to the H. G. Christman Co., Union Trust Building, for two four-story and basement additions, 100 x 600 ft., and 100 x 500 ft., respectively, estimated to cost about \$150,000 each. Albert Kahn 100 Marquette Building, Detroit, is architect.

The Burdick Tire & Rubber Co., Noblesville, Ind., is installing equipment at its plant and plans to commence operations in July, with employment of about 100 men, developing a capacity of 5000 tires a day in the near future.

Milwaukee

MILWAUKEE, June 12.

There were 980 more men working in Milwaukee on June 1 than on the first day of the preceding month, according to a nation-wide survey of the Department of Labor made public this week. For the entire State of Wisconsin most of the industries were running at 85 per cent of capacity, and there was a decided increase in the number of employed, with the iron and steel industries leading. Machinery and machine tools show a slight improvement, the report stated. Shop laborers are wanted in nearly all the factories connected with the automobile industries. Production of steel continues to increase.

The H & M Body Mfg. Co., Racine, Wis., will construct a \$125,000 addition to its plant in the form of a large drying kiln for bodies. There are at present 1150 men employed by the company and the addition is expected to increase the present working force materially.

Manitowoc, Wis., will have a new grinding company with the recent organization of the Rahr Grinding Co. by William, Max, Reinhardt and Neils Rahr, sons of the late William Rahr of the Rahr Melting Co., this city. Special machinery has been ordered and the company will be equipped with the latest facilities for cylinder grinding.

The Nash Motors Co., Milwaukee, will build a \$250,000 addition to its plant. The construction of the new buildings

will enable the Nash Four to be made in its entirety at the Milwaukee plant without dependence on the Racine works.

The Claybourn Process Mfg. Co., Menasha, Wis., manufacturer of printing and lithographing machinery and equipment, is locating its plant in Milwaukee and will invest \$500,000 in new buildings and equipment. The proposed building as designed by Herman Esser, 82 Wisconsin Street, Milwaukee, calls for a one-story brick and steel structure, 115 x 200 ft., to contain one 3-ton and one 10-ton electric traveling crane; a power and a boiler house, 30 x 80 ft., with a steel stack; and a storage, warehouse and office building, 100 x 180 ft. At the present time the manufacturing building is the only one upon which contracts have been awarded. The architect will be ready for bids on the other buildings next week.

The first machine shop in Superior, Wis., specializing in automobile work, the E. M. Anderson Co., was opened at 1607 Ogden Avenue last week. Cylinder regrinding, pistons, piston rings and steel starting gears are made and a new regrinding method is substituted for the old method of reboring cylinders.

The Central South

ST. LOUIS, June 12.

The L. Singer Produce Co., 5 City Market, Kansas City, Mo., will take bids at once on refrigerating machinery, cold storage equipment, electric elevators, conveying apparatus, etc., for its new three-story and basement cold storage and warehouse building, 80 x 100 ft., at Second Street and Grand Avenue, for which ground has been broken. It is estimated to cost about \$150,000, including machinery. The Tait-Nordmeyer Engineering Co., International Life Building, St. Louis, is engineer.

The Standard Foundry & Mfg. Co., 204 Security Building, Kansas City, Mo., has awarded contract to G. M. Baltis, Kansas City, for a new one-story plant, 90 x 120 ft., with extensions, estimated to cost about \$125,000, including machinery. It was organized recently with a capital of \$250,000, with W. H. Simpson president.

The Measurite Co., Louisville, has plans nearing completion for a new one-story factory at Fourteenth and Hill streets, totaling about 50,000 sq. ft. of space, for the manufacture of gasoline pumps and equipment. It is estimated to cost about \$100,000, with machinery. Tampton Aubuchon is president.

The Mahan-Jellico Coal Co., Packard, Ky., will build a new steel tippie, replacing a structure recently destroyed by fire.

The Northwest Missouri State Teachers' College, Kirksville, Mo., has rejected all bids recently received for extensions and improvements in the power plant and will take new bids on revised plans at an early date. Dr. C. W. Green, Brookfield, Mo., is in charge.

The Board of Administration, Topeka, Kan., will soon commence the erection of a new two-story power house, 35 x 75 ft., estimated to cost \$50,000, at the new Bell Memorial Hospital at Rosedale, Kan. J. A. Kimball is in charge.

The Consolidated Asphalt Co., Louisville, recently organized with a capital of \$1,000,000, has plans under way for new works on property recently acquired, to consist of main asphalt producing building, pumping plant, power house, machine shop, etc., estimated to cost about \$400,000, with machinery. M. M. Ford, Gallatin, Tenn., is president.

E. J. Robinson, Cheney, Kan., is arranging a list of equipment for installation in a new local machine works, to include forging equipment, lathe, drill press, grinding machine, etc.

The Oklahoma Producing & Refining Corporation, Muskogee, Okla., a subsidiary of the Pure Oil Co., 74 Broadway, New York, has acquired a controlling interest in the Oklahoma Central Oil Co., for about \$1,000,000. The plants of the acquired company have an output of approximately 5400 bbl. of oil per day which will be increased later. The refinery at Muskogee will be enlarged.

The Radio Oil-Gas Stove Co., Oklahoma City, Okla., has tentative plans for the establishment of local works to manufacture oil and gas stoves, and other heating and cooking apparatus. Charles V. Stuart is president and manager.

The Triumph Tractor & Truck Co., 114 Southwest Boulevard, Kansas City, Mo., has acquired the plant of the Dearborn Iron Foundry, Dearborn, Mo., for the manufacture of tractor and truck castings. The plant was built about two years ago, the investment approximating \$250,000, with equipment, and has been specializing in iron and brass castings.

The Simmons Co., Kenosha, Wis., manufacturer of brass and iron bests, springs, etc., has leased a two-story

building, 96 x 110 ft., to be erected at 1217-23 Union Avenue, Kansas City, Mo., for a new factory branch. Two additional floors will be added to the works later.

E. L. Billings, 221 South Lawrence Street, Wichita, Kan., is arranging a list of equipment to be installed in the machine shop at his automobile service works, including lathe, drill press, emery wheel, bench tools, etc.

The West Missouri Power Co., Clinton, Mo., has acquired a local site and plans the erection of a new electric power plant.

The Amerada Petroleum Co., Tulsa, Okla., has tentative plans for the construction of a gasoline extraction plant in the Amerada field, near Ardmore, Okla., estimated to cost in excess of \$100,000, including machinery. W. M. Lovejoy is general manager.

S. H. Gaitskill, McIntosh, Ark., and associates, are planning the organization of a company to build and operate an ice-manufacturing and cold storage plant.

The Common Council, Okeene, Okla., will take new bids on revised plans until July 6 for the construction of additions to the municipal electric power plant, estimated to cost about \$40,000. V. V. Long & Co., 1300 Coldord Building, Oklahoma City, Okla., are engineers.

The Arkansas Foundry Co., Sixth and Thomas streets, Little Rock, Ark., is planning to rebuild the portion of its plant recently destroyed by fire.

A vocational department will be installed in the high school to be erected at Walnut Ridge, Ark., estimated to cost close to \$85,000.

The Common Council, Slater, Mo., is arranging a bond issue of \$25,000, the proceeds to be used for extensions and improvements in the municipal power plant.

The Moss Mfg. Co., 14 North Seventh Street, Oklahoma City, Okla., manufacturer of automobile equipment and accessories, has tentative plans for the erection of an addition.

The Southern Engine & Boiler Works, Jackson, Tenn., was in operation from 1854 to 1917 when the plant was reorganized and went under the name of the Southern Engine & Boiler Mfg. Co. until about 18 months ago, at which time the name was changed to the Harvey Steel Products Corporation, and in a short time the plant was thrown into the hands of a receiver. It was so operated for over a year. By order of the United States District Court the plant was sold at public auction and was purchased by W. H. Collier, Fletcher Goodwill and associates for \$100,000 cash. The name was changed back to the Southern Engine & Boiler Works. The receiver's inventory showed the plant worth approximately \$900,000.

The Gulf States

BIRMINGHAM, June 12.

The Gulf Welding & Machine Works, Beaumont, Tex., has tentative plans under way for a new foundry and machine shop on property recently acquired. It is proposed to have the structures ready for service in the fall.

Fire, June 2, destroyed a portion of the ice-manufacturing plant of the Milldale Ice Co., Panama Park, Jacksonville, Fla., with loss estimated at about \$40,000. It is planned to rebuild.

The Merchants' Produce Co., Amarillo, Tex., will commence the immediate erection of a new one-story ice-manufacturing plant. Other units will be constructed later.

The Oil Mill Machinery & Automatic Press Co., Fort Worth, Tex., recently organized with a capital of \$100,000, has acquired the local plant of the Oil Mill Machinery & Mfg. Co., West Seventh Street and the St. Louis & San Francisco Railroad, and will take immediate possession. Extensions and improvements will be made to cost about \$50,000. The new company is headed by W. A. Bennett, W. N. Moore and T. B. Yarborough.

The Common Council, Punta Gorda, Fla., has tentative plans under way for a municipal electric light and power plant.

The Huber Carbon Co., Swartz, La., has preliminary plans in progress for extensions to double, approximately, the present output. Considerable new equipment will be installed. It also contemplates the construction of a new gasoline extraction plant.

The Motor Wheel Corporation, Lansing, Mich., has acquired property, 375 x 435 ft., at Shreveport, La., for the erection of a new branch plant to manufacture wire and other wheels for automobiles. T. H. Wagner, Shreveport, is local manager.

Fire, May 29, destroyed a portion of the automobile service and machine repair works of the Henry L. Vaughn Automobile Co., Commerce Street, Fort Worth, Tex., with loss estimated at about \$100,000.

The San Antonio Public Service Co., San Antonio, Tex.,

is planning the erection of an addition to its power house, estimated to cost about \$30,000.

The Magnolia Petroleum Co., Fort Worth, Tex., will install a series of electrically-operated pumping plants in connection with its pipe line from Fort Worth to Corsicana. The machinery in other pumping plants will be improved and new pumping units installed as required.

The Gulf Refining Co., Port Arthur, Tex., has awarded a contract to Stewart & Co., Port Arthur, for a four-story addition to its refinery at West Port Arthur, 175 x 175 ft., and estimated to cost about \$250,000, including equipment.

The Bennett Motor Co., Dallas, Tex., has leased the new two-story building, 100 x 150 ft., now being erected at Walker and Baylor streets, for the establishment of a new service works, with machine shop. It will cost close to \$45,000.

The Davis-George Mfg. Co., Box 1461, Dallas, Tex., manufacturer of sheet metal products, will increase its line of production to include stove pipe, elbows and kindred specialties. The company has recently increased its capital to \$100,000, for general expansion, plant enlargement, etc.

The Hazlehurst Ice & Creamery Co., Hazlehurst, Miss., has completed plans for a new ice-manufacturing and refrigerating plant, with initial output of about 25 tons daily, to be increased later. W. H. Emmerson is general manager and engineer.

The Pacific Coast

SAN FRANCISCO, June 6.

The United States Electrical Mfg. Co., Los Angeles, has awarded a contract to the Austin Co., Pacific Electric Building, for a new one-story plant, 150 x 200 ft., estimated to cost about \$35,000.

The American Water & Power Co., Auburn, Cal., is perfecting plans for its proposed hydroelectric generating plant in Placer County, to have an ultimate capacity of 200,000 hp. and estimated to cost in excess of \$15,000,000, including transmission system. Ellery, Frost & Patten, Merchants' National Bank Building, San Francisco, are engineers.

The California Electric Co., Los Angeles, is planning for the erection of a new factory to manufacture special electrical products, including a combination heater and fan. It is estimated to cost about \$200,000, including machinery. A. H. Vance is vice-president.

The Wilson & Willard Mfg. Co., Vernon, Los Angeles, manufacturer of oil well tools and machinery, has had plans prepared for a new pattern shop and a one-story power house. John P. Krempel and Walter E. Erkes, 538 Bradbury Building, are architects.

The Santa Fe Railroad Co., Kerckhoff Building, Los Angeles, will build an addition to its ice-manufacturing and car-icing plant at Bakersfield, Cal., to double the present capacity. It will cost about \$45,000.

The California Wire Co., Orange, Cal., is completing plans for an addition to its plant to cost \$65,000, including equipment.

The Public Service Commission, 207 South Broadway, Los Angeles, will take bids until June 27, for an electric generator, transformers, hydraulic equipment, and auxiliary electrical equipment, for municipal power service, according to specification P-262. James P. Vroman is secretary.

The Crane Co., Second and Brannan streets, San Francisco, with headquarters at Chicago, will soon take bids for the erection of a four-story factory branch at Sacramento, Cal., estimated to cost about \$125,000. Woollett & Lamb, Hagelstein Building, are architects.

The Santa Ana Commercial Co., Santa Ana, Cal., has plans under way for a new ice-manufacturing and cold storage plant on East First Street, to cost about \$75,000, including machinery.

Taylor & Green, Pasadena, Cal., operating a sheet-metal working factory, have leased a new one-story building, 40 x 160 ft., to be erected on South Fair Oaks Avenue, for a new plant.

The Pacific Fruit Express Co., 65 Market Street, San Francisco, a subsidiary of the Southern Pacific Railroad Co., will soon commence the erection of new ice-manufacturing plants at Nampa and Pocatello, Idaho, estimated to cost about \$50,000 each.

The Cranston Wire Binding Machinery Co., Spokane, Wash., manufacturer of automatic wire-binding machines, is planning for extensions. It was incorporated recently with a capital of \$100,000 for expansion.

The Commercial Iron Works, East Seventh and Madison streets, Portland, Ore., have plans under way for the erection of a new one-story works, 65 x 200 ft. R. Daley is engineer for the company.

The City Engineering Department, Sacramento, Cal., has preliminary surveys under way on the Silver Creek, El

Dorado County, for three or more municipal hydroelectric power plants, total capacity of about 100,000 hp., with transmission systems, estimated to cost in excess of \$6,000,000. Albert Given is city engineer.

The California Wire Co., Orange, Cal., has awarded contract to the Austin Co., Pacific Electric Building, Los Angeles, for a new one-story plant, 130 x 175 ft., estimated to cost \$30,000.

The Pacific Sanitary Mfg. Co., Richmond, Cal., recently organized with a capital of \$2,000,000, will take over an enameled iron works in North Richmond, and two potteries in Richmond and San Pablo, Cal., respectively. Plans are under way for additions and it is proposed to double the present output. N. W. Stern is president, and M. E. Wangerheim, vice-president.

The Pacific Power & Light Co., Portland, Ore., is completing plans for a new hydroelectric generating works near Hood River, Ore., with initial capacity of about 7500 hp., estimated to cost in excess of \$1,000,000 with machinery. H. H. Scholfield is chief engineer.

E. A. Moulton, 609 East Eleventh Street, Portland, Ore., will build a new one-story machine shop, 50 x 100 ft. Plans have been prepared by Strong & McNaughton, Portland, architects.

The Richy & Gilbert Co., Yakima, Wash., will commence the immediate construction of a new cold storage and refrigerating plant estimated to cost close to \$90,000, including machinery.

The Edward Miller Cornice & Roofing Co., Tacoma, Wash., manufacturer of sheet metal and other products, will build a new three-story plant at 1506 Broadway.

Canada

TORONTO, June 12.

Machine-tool buying continues steady with some improvement noted each week. Most local dealers state that sales for May were the best for any month this year, while some point out that it was the best since the depression set in. Orders for one, two and three machines are increasing, but big lists are still absent. Inquiries are also more numerous. Salesmen who have recently returned from northern Ontario state that a strong market is being built up there for mining machinery and orders from this source are on a more extensive scale than formerly. Used equipment is moving in a fairly brisk way, but dealers state that orders for new machinery and tools are becoming more pronounced each week. A slight falling off in demand was reported in small tools the past week, but this is expected to be only temporary.

The A. D. Porter Mfg. Co., Galt, Ont., has been organized to manufacture pressed brass and steel products and has secured a building on Hobson Street, which is being remodeled and machinery installed.

The Sinden brick and tile yards, Tillsonburg, Ont., which have been idle for several years have been taken over by Cowell Brothers, who have started work on additions and repairs.

Jonquieres, Que., is having plans prepared for waterworks plant to cost \$20,000. J. F. Grenon, Chicoutimi, Que., is engineer.

The Don Valley Paper Mills, Ltd., Toronto, which recently was damaged by fire, will rebuild the boiler room at a cost of \$20,000.

The general contract for construction of a plant at Brockville, Ont., for the E. F. Phillips Electric Works, De Gaspe Street, Montreal, has been awarded to J. A. Grant & Co., 10 Cathcart Street. Melville J. Miller, 364 Dorchester Street, Montreal, is architect.

Bids will be received by M. C. Irvine, secretary, Oakville Water & Light Commission, Oakville, Ont., until June 22, for an addition to the pumping house and furnishing and erecting gasoline or oil engines, turbine pumps and electric generators.

The Colby Steel & Engineering Co., Hastings Street West, Vancouver, B. C., has the contract for the supply and installation of a 5-ton traveling crane to cost \$40,000 required for a drydock to cost \$4,300,000 for the Dominion Government at Esquimalt, B. C.

The lumber mill at High Prairie, Alta., owned by J. K. Eggenberger & Sons, was destroyed by a fire with a loss of \$40,000.

The Cape Breton Cold Storage Co., North Sydney, N. S., will erect a plant there to cost \$200,000. James Clarke is secretary.

The St. John, N. B., City Council proposes to install an electric power distribution system at a cost of \$900,000. The engineer in charge is H. Phillips, care of New Brunswick Contracting Co., 109 Prince William Street.

The Canadian Vickers, Ltd., has recently undertaken the manufacture of mining, power and general industrial machinery at the Longue Point works in Montreal. Agreements have been made with several United States firms to manufacture a wide range of equipment, including many articles which heretofore were not made in Canada.

The Taylor Instrument Co., Rochester, N. Y., has completed negotiations for the purchase of the property at 110-112 Church Street, Toronto. Extension of manufacturing facilities will take place as demand arises.

The Matachewan River Co., has been formed and will operate a plant on the Montreal River to supply power to Kirkland Lake, Elk Lake, Gowganda and Shining Tree mining camps. It will have a capital stock of \$500,000 and has power rights on the Indian Chutes and Big Ben. When complete it will produce 13,000 hp. Construction work has started on the plant and equipment will be purchased immediately. The officers are: President, Robert Fennell, Toronto; vice-presidents, F. G. Westaway, Hamilton, Ont., Col. Robert Stark, Montreal; directors include D. W. Caldwell, Perth, Ont.; Sir H. L. Galway, London, England; H. W. Sutcliffe, New Liskeard, Ont.

The plant of the Muskoka Wood Mfg. Co., Huntsville, Ont., was destroyed by fire May 29. It consisted of a well-equipped sawmill and hardwood flooring factory, both of which, with all equipment, will be a total loss. No definite statement regarding rebuilding has so far been made.

The Canada Wire & Cable Co., Leaside, Toronto, will establish a plant in Vancouver, B. C., where 300 or 400 men will be employed. H. Horsman, general manager, will leave for the Coast in the near future to superintend the commencing of building operations. The Vancouver plant will supply the demand in the Western Provinces.

J. Walter & Sons, Kitchener, Ont., manufacturers of wood fibre products will erect a new building, 100 x 200 ft., which will provide three times the capacity of the old plant, and will install considerable new equipment.

Allison Peck, Hillsboro, N. B., will build a wood-working factory at Moncton, N. B., to cost \$10,000.

Bids will be called for construction of asphalt plant for city of Niagara Falls, Ont. J. C. Gardner is engineer.

The Falls Machinery & Supplies, Ltd., Niagara Falls, Ont., has been incorporated with a capital stock of \$40,000 by Stanley H. Frost, John C. Gardner, Albert W. Tubbs and others to manufacture machinery, tools, boilers, etc. It will start work at once on the erection of a warehouse and office building.

The St. Thomas Packing Co., St. Thomas, Ont., will build a cold storage plant at Welland, Ont., to cost \$100,000.

La Cie Electrique de Papineauville, Papineauville, Que., will build power house to cost \$30,000.

The Town Council, Thessalon, Ont., will construct a hydroelectric power plant consisting of dam and power house, with 200 hp. turbine and generator, and three miles of transmission line. It is also proposed to electrify the water-works pumping station by the installation of a motor-driven pump and a gasoline engine-driven fire pump. Bids will be called for soon. James, Proctor & Redfern, Ltd., 36 Toronto Street, Toronto, are engineers.

Allison Ridden, Kentville, N. S., will build a saw mill to cost about \$40,000.

The Pacific Meat Co., 268 Columbia Street, Vancouver, B. C., is contemplating erecting an abattoir and cold storage plant to cost \$100,000.

The York Wrench Co., Fort William, Ont., recently incorporated has taken over the Kelly warehouse on Hardisty Street, which will be equipped for the manufacture of wrenches, etc.

The Canadian Electric Castings Co., Orillia, Ont., has started work on an addition to its plant. It manufactures electric furnace products largely for mining and cement industries, also bronze, brass, iron and steel castings.

The Fisher Motor Co., Orillia, Ont., manufacturer of die castings and metal stamping is taking over new premises to care for increased business.

Detroit

DETROIT, June 12.

The Jig Bushing Co., Pontiac, Mich., manufacturer of bronze bushings, etc., has filed plans for a one-story addition.

The Washtenaw Motor Co., Ann Arbor, Mich., will take bids at once for a one-story automobile service building and machine shop, 160 x 200 ft., with wing extension, 30 x 55 ft., estimated to cost close to \$75,000. Cuthbert & Cuthbert, 327 East Huron Street, are architects.

The Farm Tractor Syndicate, St. Louis, manufacturer of motor-driven tractors, is negotiating with John Robbins,

secretary of the Industrial Committee of the Chamber of Commerce, Detroit, for the purchase of a one-story building for the establishment of a new plant.

The Fisher Body Corporation, General Motors Building, Detroit, has awarded contract to W. E. Wood & Co., 1805 Ford Building, for a six-story plant at West End Avenue and Fort Street, to be connected and used with plant No. 18. It will be 100 x 1000 ft. The cost is estimated in excess of \$400,000, including machinery. Albert Kahn, Marquette Building, is architect. The company has also acquired the former plant of the Cadillac Motor Car Co., Case Avenue, aggregating about 650,000 sq. ft., for the manufacture of special automobile bodies. Employment will be given to about 2000 operatives.

The Stafford Roller Bearing Co., Lawton Mich., will build by day labor a new one-story plant, estimated to cost about \$40,000. L. K. Stafford is president, and O. J. Cole, engineer.

A one-story power house, 70 x 100 ft., will be erected at the plant of Parke, Davis & Co., 2951 Atwater Street, Detroit, manufacturer of drugs, etc.

The Ruggles Motor Truck Co., Bad Axe, Mich., has acquired a site for the erection of a new plant, 50 x 175 ft. Plans will be prepared at once.

The Board of Education, City Hall, Grand Rapids, Mich., has awarded contract to the Miller-Boyer Co., Kalamazoo, Mich., for the first unit of its vocational school, to be four stories, 100 x 175 ft., and estimated to cost about \$275,000. Other units will be constructed in the near future. Williamson, Crow & Proctor, 611 Gilbert Building, are architects.

The Hayes-Ionia Co., Grand Rapids, Mich., manufacturer of automobile bodies, has plans under way for two additions, to provide about 60,000 sq. ft. of additional space and to employ approximately 500. The company has contracted with the Durant Motor Co. for closed car bodies for the next 12 months, aggregating about \$15,000,000.

The Jennison Hardware Co., 901 North Water Street, Bay City, Mich., is taking bids for two one-story shops, and a one-story warehouse, 60 x 200 ft., 40 x 200 ft., and 100 x 250 ft., respectively, estimated to cost about \$400,000, including equipment. H. W. Jennison is president.

Trade Changes

The Barde Industrial Co., Seattle, Wash., a partnership, has been dissolved and a corporation formed to continue the business of the former partnership under the firm style of Barde Steel & Machinery Co. The members of the corporation are the same as of the former partnership.

The E. L. Essley Machinery Co., Chicago, has been appointed sole agent in the Chicago district for the line of portable electric drills and grinders manufactured by the James Clark Jr. Electric Co., Louisville, Ky.

The Worcester Machinery Co. on and after July 1 will be located at 140 Commercial Street, Worcester, Mass.

The Fred. C. Dickow Machinery Co.'s main office and sales-room is now located at 2105 West Lake Street, Chicago. As for the past 15 years it is a dealer in new and used machinery, tools and is manufacturer of the Dickow 10-in. universal index centers.

The Iron Products Corporation, New York, and its subsidiaries, the Central Foundry Co., Central Iron & Coal Co., Central Radiator Co. and Molby Boiler Co., announce the opening of a district sales office in the Jefferson County Bank Building at Birmingham, Ala. T. C. Hyde will be manager of the new office, under the direction of J. L. Brierton, vice-president and general manager of the Central Iron & Coal Co. Mr. Hyde will continue the sale of "Universal pipe" in the southern territory, which he handled from the Central Foundry Co.'s Atlanta office, now discontinued. W. Z. Reynolds, whose headquarters have heretofore been in Chattanooga, will continue, from the new office, the sale of Tuscaloosa and Warrior pig irons, Holt foundry and furnace coke, and other products of the Central Iron & Coal Co. Hewitt Thompson will sell Radio open fireplace hot water radiators and other heating and plumbing specialties of the Central Foundry Co. and the Central Radiator Co.

The statement published in THE IRON AGE of May 11 that the August Mietz Corporation, New York, had changed its name to the Reliance Engine Corporation was incorrect. The August Mietz Corporation is still in existence and no change of name is contemplated. The company recently sold certain shop machinery, tools and equipment, but the purchasers did not acquire the corporation, or any stock in it.

W. C. Buell, Jr., referred to on page 1643 of the June 8 issue of THE IRON AGE as one of the organizers of Buell, Scheib, Mueller, Inc., Pittsburgh, was never chief engineer of the George J. Hagan Co., but was chief engineer of the liquid fuel department during his connection with that company.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined iron bars, base price	2.58c.
Swedish bars, base price	7.00c.
Soft steel bars, base price	2.58c.
Hoops, base price	3.63c.
Bands, base price	3.23c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base	2.68c.
Channels, angles and tees under 3 in. x	
¼ in., base	2.58c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	2.60c.
(Smooth finish, 1 to 2½ x ¼ in. and larger) ...	2.80c.
Toe-calk, ½ x ¾ in. and larger	3.30c.
Cold-rolled strip, soft and quarter hard. 6.25c. to 7.25c.	
Open-hearth spring steel	3.50c. to 6c.
Shafting and Screw Stock:	
Rounds	3.35c.
Squares, flats and hex.	3.85c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¼ in. and heavier	2.68c.
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Sheets

Blue Annealed

	Per Lb.
No. 10	3.48c. to 3.63c.
No. 12	3.53c. to 3.68c.
No. 14	3.58c. to 3.73c.
No. 16	3.63c. to 3.83c.

Box Annealed—Black

	Soft Steel	Blued Stove
	C. R., One Pass.	Pipe Sheet,
	Per Lb.	Per Lb.
Nos. 18 to 20	4.00c. to 4.15c.	.....
Nos. 22 and 24	4.05c. to 4.20c.	3.35c.
No. 26	4.10c. to 4.25c.	4.40c.
No. 28	4.20c. to 4.35c.	4.50c.
No. 30	4.45c. to 4.60c.	.....
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14	4.30c. to 4.45c.
No. 16	4.45c. to 4.60c.
Nos 18 and 20	4.60c. to 4.75c.
Nos. 22 and 24	4.75c. to 4.90c.
No. 26	4.90c. to 5.05c.
No. 27	5.05c. to 5.20c.
No. 28	5.20c. to 5.35c.
No. 30	5.70c. to 5.85c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel			Wrought Iron		
	Black	Galv.		Black	Galv.
½ in. Butt.	—56	—40	¾ in. Butt.	—30	—13
¾ in. Butt.	—61	—47	1½ in. Butt.	—32	—15
1-3 in. Butt.	—63	—49	2 in. Lap.	—27	—10
3½-6 in. Lap.	—60	—46	2½-6 in. Lap.	—30	—15
7-8 in. Lap.	—56	—34	7-12 in. Lap.	—23	—7
9-12 in. Lap.	—55	—33			

Steel Wire

	Per Lb.
Bright basic	3.50c. to 3.75c.
Annealed soft	3.50c. to 3.75c.
Galvanized annealed	4.25c. to 4.50c.
Coppered basic	4.00c. to 4.25c.
Tinned soft Bessemer	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	16¾c. to 17¼c.
High brass wire	17¼c. to 17¾c.
Brass rod	14¾c. to 15¾c.
Brass tube, brazed	23¾c. to 24½c.
Brass tube, seamless	20 c. to 20½c.
Copper tube, seamless	22¼c. to 23¼c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 20¾c. to 21¾c. per lb. base.	
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.	

Tin Plates

Bright Tin	Grade	Grade	Coke—14-20	Primes	Wasters
	"AAA"	"A"			
	Charcoal	Charcoal			
	14x20	14x20			
IC. \$10.00		\$8.50	80 lb. \$6.05	\$5.80	
IX. 11.50		10.00	90 lb. 6.15	5.90	
IXX. 13.00		11.25	100 lb. 6.25	6.00	
IXXX. 14.25		12.50	IC. 6.40	6.15	
IXXXX. 16.00		14.00	IX. 7.40	7.15	
			IXX. 8.40	8.15	
			IXXX. 9.40	9.15	
			IXXXX. 10.40	10.15	

Terne Plates

8-lb. coating, 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	9.00

Tin

Straits, pig	34½c.
Bar	41c. to 45c.

Copper

Lake ingot	15¼c.
Electrolytic	15 c.
Casting	14¾c.

Spelter and Sheet Zinc

Western spelter	6¾c. to 7c.
Sheet zinc, No. 9 base, casks	8½c. open 9c.

Lead and Solder*

American pig lead	6¾c. to 7c.
Bar lead	8c. to 8½c.
Solder, ½ and ½ guaranteed	25c.
No. 1 solder	23½c.
Refined solder	20¼c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c.
Grade D, per lb.	25c.

Antimony

Asiatic	6½c. to 7c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	25c. to 27c.
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Old Metals

There has been a moderate business this week, but values are holding firm. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	11.75
Copper, heavy wire	11.25
Copper, light and bottoms	8.75
Brass, heavy	6.00
Brass, light	5.00
Heavy machine composition	8.50
No. 1 yellow brass turnings	5.75
No. 1 red brass or composition turnings	7.75
Lead, heavy	4.50
Lead, tea	3.25
Zinc	2.75

